METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Volume 10, 1959

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AMERICAN METEOROLOGICAL SOCIETY

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Bibliography on Acoustical Propagation

July 1959 No. 7

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A. Current Abstracts in English on important meteorological literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

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MAIN

INDUSTRY · ENGINEERING · AGRICULTURE · COMMERCE · AERIAL AND MARINE NAVIGATION · PUBLIC HEALTH
AMERICAN METEOROLOGICAL SOCIETY
1919

SPECIAL FEATURE IN THIS ISSUE

Bibliography on Acoustic and Explosion Waves (Supplement)

By
Geza Thuronyi

(*For complete table of contents see back cover*)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ring to the attention of meteorologists current literature in their field.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a pecial subject (usually arranged chronologically).

Bibliographies published in the successive issues were:

Vol. I, 1950

. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm
. Condensation Trails	10. Clim. of N. E. Africa	11. Mountain Met.	Detect.

Vol. III, 1952

. Clim. of N. W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V. 1954

. Oceanog. Met.	2. Clim. of S. E. Asia	3. Auroral Physics	4. Tropopause
. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.		3. Storm Surges
Ionospheric Prop.	5. Photochem.—Upper Atmos.		6. Cloud Physics
Radar Cloud Physics	8–9. Atmos. Nuclei	10. Weather Modification	11. Cooling Power

Vol. VII, 1956

Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
Snow Micromet.	8. Snow Micromet. (Suppl.)	9–11. Tropical Cyclones

Vol. VIII, 1957

Solar Weather Relations	2. Night Airglow	3. Forecasting Special Elements
Forest Micrometeorology	5. Hydromet. Forecasting	6. Numerical Forecast. (Suppl.)
Albedo 8. Meteors	9–10. Tropospheric Prop.	11. Medical Meteorology

Vol. IX, 1958

Radioastronomy	2. Solar Astrophysics	3. Radioactivity in Atmosphere
Waves and Currents	5. Physical Oceanog.	6. Dynamic & Phys. Oceanog.
Long Range Forecast.	8. Radar Met. 9. Cosmic Rays	10–11. Geomagnetism

Vol. X, 1959

1. Works of C. E. P. Brooks 2. Tornado Forecasting 3. Soil Moisture 4. Sferics
6. Ozone 7. Acoustic Waves

Other bibliographies in preparation are:

Actinometers	*High Atmosphere Temperatures*	*Singularities*
Evaporation	*Micrometeorology*	*Synoptic Aerology*
Frost	*Radiation*	*Thunderstorms*

Part III contains a listing of reviews, translations, reprints, and the contents of important blications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue mprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

10.7–1 551.509.313:551.515.2(08)(52)

Vortex: Collected papers of the Numerical Weather Prediction Group, Tokyo, No. 3, ssued July 1958. Reprints of papers from the **Meteorological Society of Japan, Journal,** ınd from **Papers in Meteorology and Geophysics,** Tokyo, **1957** and **1958** issues. All papers ›reviously abstracted from the original sources. **DWB**—A collection of 27 papers in English, ›n numerical prediction (vorticity, typhoon and upper wind forecasting, etc.) by Japanese ıuthors, similar to Vol. 2 (*see* 9.11–3, Nov. 1958, *MAB*. For listing of papers of Vol. 2, *see* Pt. 3, p. 1046, Aug. *MAB*). *Subject Headings:* **1. Numerical forecasting studies 2. Numerical yphoon forecasting 3. Japan. I. Japan. Numerical Weather Prediction Group, Tokyo.** —*M.R.*

10.7–2 550.3(08)

†**Advances in Geophysics,** Vol. 5. Ed. by H. E. Landsberg and J. Van Mieghem. N. Y., Academic Press, 1958. 325 p. figs., tables, bibliogs. (For listing of contents, *see* Pt. III, ›. 309, Feb. 1959, *MAB*.) All articles abstracted separately. **DWB, DLC**—The most ompetent reviews on advances in geodesy, tide science, microseisms, cloud modification, nternational geophysical cooperation undertakings and ultraviolet absorption or photo- hemical processes in the upper atmosphere are collected into this 5th vol. of the now well- stablished series on **Advances in Geophysics.** Each article is systematically outlined and rranged, has ample supporting data and graphical material, an extensive bibliography with areful citations in text, and the whole volume indexed by author and subject (including ›ibliographic citations), and a cumulative subject index provided for Vol. 1–4. These **Ad- ances** provide the best and only approximation of a textbook on all phases of geophysics vailable in English. (For earlier vols., *see* 4.4–10, April 1953; 6.7–1, July 1955; 8.8–1, Aug. 957; 9.9–2, Sept. 1958, *MAB*.) *Subject Headings:* **1. Advances in Geophysics. I. Landsberg, H. E.** (*ed.*) **II. Van Mieghem, J.** (*ed.*).—*M.R.*

TEXTBOOKS AND TECHNICAL BOOKS

See also: **Chemistry of sea water** (Harvey), 10.7–89.

10.7–3 551.509.33(02)

*†Baur, Franz, **Physikalisch-statistische Regeln als Grundlagen für Wetter- und Wit- erungsvorhersagen.** [Physical-statistical rules as bases for forecasts of weather and weather haracter], Vol. 2. pub. Frankfurt a.M., Akademische Verlagsgesellschaft MBH, **1958.** 52 p. 23 figs., 60 tables, bibliogs. Foreword, table of contents, headings in text in German nd English. Parts of Ch. 6 and 10 accompanied by English transl. **DWB** (M09.3 B351p)— ol. 1 (*see* 8.11–2, Nov. 1957, *MAB*) gave basic principles and operating aids for short range nd extended forecasting on the basis of solar influences on the general circulation. This econd volume gives rules for monthly and seasonal forecasts based on terrestrial observations, easonal changes and singularities in circulation types in various regions. Ch. V takes up ecurrences of circulation types in Dec., Jan.–Feb., May, June, effect of Atlantic in November n subsequent winter in Europe and in Oct. on winter in Central Europe; Ch. VII, weather ules for Europe, Toronto and the northeastern U. S. based on singularities; VIII and IX, hanges which follow other changes at certain seasons; X, Recent discoveries connected with

solar influences on weather and circulation types. Many extensive tables and "catalogs" of weather types or events, and graphs for numerous places are included with text. *Subject Headings:* **1. Long range forecasting textbooks 2. Statistical bases for long range forecasting 3. General circulation types 4. Singularities 5. Weather rules 6. Extended range forecasting rules.**—*M.R.*

10.7–4 551.58(02)

†Koeppe, Clarence E. and De Long, George C., **Weather and climate.** N. Y., McGraw-Hill Book Co., **1958.** 341 p. numerous figs. (incl. photos), foot-refs., bibliog. p. 303–307. **DWB, DLC** (QC863.K714)—A delightfully up-to-date and nicely illustrated textbook on elementary meteorology and climatology for use in college courses, for geographers and others who want a snap course involving no mathematics or physics or anything more tedious than the Köppen system of climatic classification. The senior author's (KOEPPE's) simplified system of climatic classification is explained in the appendix and illustrated with a color chart of the world, together with color charts of natural vegetation regions and KÖPPEN's climatic regions of the earth. Half of the large format book deals with the usual weather elements: atmosphere, temperature, moisture, wind, circulation, air masses and fronts, synoptic weather and storms, atmospheric optics, weather lore, etc., and the last half with climate, physical climate, world distribution of temperature, of pressure and winds, of precipitation and climates of the humid tropics, deserts, humid mesothermal, humid microthermal and polar and arctic zones. The appendix contains a nice list of textbooks and aids published since 1942, conversion tables and climatic data for 275 or more selected stations all over the earth. Instruments are treated under the headings for each element observed, a few typical synoptic series or type maps (even 500 mb charts) are included and described. Some original isorithm charts of the world, a number of standard temperature-precipitation graphs for typical stations in each climatic region, and many fine photographs showing effect of climate on landscapes are included. The jet stream, tropopause, airplane weather reconnaissance, radar photos of hurricanes, etc. are a few of the recent discoveries mentioned in the text. *Subject Headings:* **1. Climatology textbooks 2. Meteorology textbooks 3. Geography courses.**—*M.R.*

10.7–5 523.5(02) 551.510.53

*†Öpik, Ernst J. (*Armagh Obs., Armagh, Northern Ireland*), **Physics of meteor flight in the atmosphere.** N. Y., Interscience Publishers, **1958.** 174 p. 14 figs., 55 tables, 64 refs., eqs. **DWB** (523.5 061ph)—This small book is concerned with phenomena connected with the flight of a meteor through the atmosphere. History of meteor research, meteors as probes of the high atmosphere, evidence of turbulence and diffusion recombination, acoustical phenomena, physico-chemical properties (classification, artificial meteors, trims, spectra, etc.), energy transfer (rotation, pressure, drag, shielding, radiation, sputtering, deceleration), ablation, and relation to atmospheric density and size, atomic collisions, meteor radiation, applications, etc. are treated without neglecting theory, and with inclusion of a great deal of empirical data in tables and graphs. Some of the physical data has been obtained from laboratory model studies. *Subject Headings:* **1. Meteor physics textbooks 2. Meteor trails 3. Upper atmosphere physics.**—*M.R.*

10.7–6 551.574.1(02)

*†Orr, Clyde, Jr. and Dallavalle, J. M., **Fine particle measurement: size, surface, and pore volume.** New York, Macmillan Co., **1959.** 353 p. figs., tables, and eqs. throughout. 34 tables in appendix. Bibliog. p. 307–349. Review by Helen Jupnik in *Optical Society of America, Journal*, 49(5): 492–493, May **1959.**—In this text, numerous techniques of measuring size, surface area and pore volume of finely divided matter of diverse forms, such as cloud and fog drops, dust and haze particles, soils, etc. are presented. Instruments, equipment and their construction, data analysis and applications are stressed. Major chapters are devoted to microscopy, sieving, sedimentation, inertial techniques, optical methods (radiation scattering and transmission), gas adsorption, liquid sorption and, finally, pore size measurements. An extensive bibliography (400 refs.) is appended. Considerable data are included in each section and in the appendix. The chapter on particle size measurement by radiation and transmission (p. 99–133) goes into the Rayleigh theory, monodisperse and polydisperse systems,

polarization, nonspherical particles, turbidity measurements, absorbing and nonabsorbing particles, and other theoretical and applied aspects. *Subject Headings:* **1. Micromeritics textbooks 2. Fine particle measurement bibliographies 3. Aerosol measurement techniques 4. Turbidity measurements.**—*M.R.*

10.7–7 551.525.4:63(02)

*†Shul'gin, A. M., **Temperaturnyĭ rezhim pochvy.** [The temperature regime of the soil.] Leningrad, Gidrometeoizdat, **1957.** 241 p. 68 figs., 134 tables, bibliog. p. 231–239. **DLC** (S594.5.S52)—Systematic presentation of information and data on soil temperature and its relation to plant growth, with special emphasis on conditions in the U.S.S.R. The 10 ch. take up respectively: I. Fundamental concepts of soil climatology (history, methodology, importance, local soil climatology); II. Basic laws of the temperature regime in the soil (heat exchange, daily and seasonal regime, relation between air and soil temperature); III. Soil temperature in the warm season (bare soil, relief, soil type and soil cover influences and geographical variations in soil temperature); IV. Effect of soil temperature on plant growth at different stages; V. Soil temperature at depths in cold season under bare and snow covered conditions, respectively; VI. Deep freezing of soil (influence of snow, vegetation, soil moisture, relief and geographical variations); VII. Winter temperature of surface layers; VIII. Role of temperature in wintering of grains; forecasting winterization; IX. Regulation of soil temperature in the cold season. Reference to about 250 Russian works and a score of western works on soil temperature and agrometeorology are included in the bibliography. Results of work at agricultural experiment stations in various parts of the U.S.S.R. are cited in text, tables, graphs and charts. Considerable attention is given to work on snow conservation and its effect on conserving winter crops. *Subject Headings:* **1. Soil temperature textbooks 2. Snow conservation 3. Agricultural meteorology 4. U.S.S.R.**—*M.R.*

10.7–8 551.5(02)

†*Khrgian, Aleksandr Khristoforovich, **Fizika atmosfery.** [Physics of the atmosphere.] 2d ed. Moscow, Gos. Izdat. Fiziko-Matematicheskoĭ Literatury, **1958.** 476 p. 218 figs., 116 tables, numerous refs., bibliog. p. 472. **DLC** (QC880.K45 1958)—This new edition of KHRGIAN's competent text on the physics of the atmosphere, (for abstract on first ed., 1953. *see* 5.7–7, July 1954, *MAB*), contains about the same amount of tabular and illustrative material on the quantitative aspects of meteorology as did the 1953 edition, but has been amplified by inclusion of recent data and findings in fields such as radiation balance, cloud physics, artificial precipitation, upper atmosphere temperature and density, tropical cyclones, fronts, general circulation, monsoons, etc. References are cited for most of the work quoted or reproduced from non-Russian sources, thus eliminating the one serious defect in the first edition. The book is also published on better quality paper and is about 20 pages larger than was the 1953 edition, (also the price has gone up 20% or 3 rubles). The 22 chapters include: 1) Composition of atmosphere, 2) Ozone, 3) Dust, 4) Water vapor, 5) Static, 6) Adiabatic processes, 7) Solar radiation, 8) Terrestrial radiation, 9) Heat exchange in soil and water and snow cover, 10) Temperature distribution, 11) Atmospheric radiation balance, 12) Temperature of upper atmosphere, 13) Evaporation, 14) Condensation in atmosphere, 15) Cloud and fog, 16) Precipitation formation, 17) Precipitation types, 18) Wind and turbulence, 19) Dynamics of circulation, 20) Fronts and cyclones, 21) Local winds, 22) General circulation over earth or parts of earth. A good subject index is included. On p. 316 it is stated that "In 1947, V. SHAEFFER in the U. S. and V. V. PIOTROVICH in the U.S.S.R., demonstrated that particles of solid CO_2 would produce rapid coalescent precipitation from supercooled clouds or fog". *Subject Headings:* **1. Atmospheric physics textbooks 2. Meteorology textbooks.**—*M.R.*

10.7–9 621.396.8:522(02)

†Brown, Robert Hanbury and Lovell, A. C. B., **Exploration of space by radio.** N. Y., John Wiley, **1958.** 207 p. 132 figs. (incl. photos), 6 tables, bibliogs. DLC (QB475.B7). Review by T. Krishnan in *Journal of Scientific Research*, New Delhi, Ser. A, 18(3):141–142, March **1959.**—A new, semitechnical textbook on the astronomical, theoretical, instrumental, observational and specialized aspects of radio astronomy, nicely illustrated with photographs of radio telescopes, equipment, instruments, records, graphs, etc. Separate chapters are

devoted to the galactic and extragalactic radio emissions, the hydrogen line, scintillation of radio stars, solar radio emissions, meteors, radio and the aurora, the moon, planets, earth satellite and, finally, a description of the Jodrell Bank radio telescope and the program of research. Techniques are thoroughly discussed in Ch. 3, and ionospheric-geomagnetic effects on radio emissions from space in Ch. 6. The chapter on radio observations of the aurora is especially complete. *Subject Headings:* **1. Radio astronomy textbooks 2. Radio observation of aurora 3. Radio observation of meteors 4. Jodrell Bank radio telescope.**—*M.R.*

10.7–10 631.4:551.556.2:339.5(47)

*†Sus, N. I. (*ed.*), **Agrolesomelioratsiia.** [Agro-forest conservation.] Moscow, Gosud. Izdatvo Sel'skokhoziaistvennoĭ Lit., **1956.** 510 p. 245 figs. (incl. photos), numerous tables, bibliog. p. 500–505. At head of t-p: Uchebniki i Uchebnye Posobiia dlia Vysshikh Sel'skokhoziaĭstvennykh Uchebnykh Zavedeniĭ. **DLC** (S605.S8)—A large and comprehensive text on the use of forests or other plantations in controlling erosion by rain, wind or runoff. The microclimatic and hydrologic factors affecting forest strip planting, the effect of forest strips on winds, temp., humidity, soil temp., etc., shelter belts on irrigated land, along railroads and methods of establishing shelter belts. Pt. 2 (p. 171–343) goes into great detail on soil erosion of various types, effect of climate, soils, vegetation and human activity, soil conservation work in the U.S.S.R., methods of erosion control, flash or erosional floods (p. 313–323), and work in various regions and physiographic types of the U.S.S.R. Pt. 3 (p. 344–500) goes into sands, their movement and control by planting trees or shrubs. Various types of sandy regions are discussed in separate chapters. Much data are included in tables and diagrams, and a long bibliog. of Russian articles arranged under the 3 main headings is appended. *Subject Headings:* **1. Shelter belts 2. Soil conservation by shelter belts 3. Sand conservation by shelter belts 4. U.S.S.R.**—*M.R.*

10.7–11 532.5(02) 551.46:532.59

†Stoker, James Johnston (*Inst. of Math. Sciences, N. Y. Univ.*), **Water waves: the mathematical theory with applications.** N. Y., Interscience Publishers, **1957.** 567 p. figs., photos, tables, bibliog. p. 545–560, eqs. Price: *12.00; 88 sh. **DLC** (QA927.S8). Review by M. S. Longuet-Higgins in *Journal of Fluid Mechanics*, London, 4(4):435–439, Aug. **1958.** Review in *Geofision Pura e Applicata*, 39:234, **1958.**—A thorough, systematic and unified treatise on water waves, starting (in Pt. I) with the derivation of the basic theory of nonviscous incompressible fluids, then going on (in Pt. II) to the approximate theory for waves of small amplitude, then (in Pt. III) taking up shallow water waves (which may be long waves) that require a nonlinear solution. Numerical methods of flood prediction are cited with an example from a flood on the Ohio River. Finally (in Pt. IV), the exact theory is applied to short term problems which require nonlinear solutions in the form of power series in time (such as breaking of a dam, or the Levi-Civita theory of two-dimensional periodic progressing waves of finite amplitude in water of infinite depth). In Pt. II problems concerning waves breaking against a vertical cliff, on a sloping beach, or around a vertical wedge are treated, and motions starting from rest, or transients are dealt with, using Fourier transform, KELVIN's stationary phase and GREEN's function techniques. Finally, applications to waves on a running stream and ship waves are introduced. All sections but Pt. III require a great deal of mathematics. This part goes into simple waves, shock waves, hydraulic jumps, solitary waves, bores, gravity waves in the atmosphere, cold and warm fronts, tides, seiches, oscillations in harbors and aerodynamic applications. The problem of waves breaking at crests is approached from both the laboratory model and from theoretical principles—as are problems of wind wave breakers and long wave breakers in shallow water (surf)—and many of the other problems cited above. Models and principles are illustrated by numerous line drawings, as well as by photographs of experimental models. The section on atmospheric waves and cyclonic waves is quite extensive for a book of this type. *Subject Headings:* **1. Water waves 2. Hydrodynamics textbooks 3. Dynamics of atmospheric waves 4. Water wave models 5. Ocean waves 6. Breakers** —*M.R.*

10.7–12 551.509.5:551.579(02

*Popov, Evgeniĭ Grigor'evich, **Gidrologicheskie prognozy.** [Hydrological forecasting. Leningrad, Gidrometeoizdat, **1957.** 460 p. 149 figs. and photos, 43 tables, 168 eqs. DLC

(GB661.P6)—A textbook (3000 copies) on methods of preparing forecasts of the water and ice regime of rivers for hydrometeorological technologists, forecasters and students or technicians in related fields. Basic observational material, surface runoff, short range forecasting of water level and runoff by two methods (time of crest arrival and runoff hydrograph), long range forecasting of elements of spring flood in plains and in mountain rivers, forecasting river stages in (summer) low water period, short and long range forecasting or frequency and breaking of ice in rivers and, finally, hydrological reports and service organization for the public or industry. *Subject Heading:* **1. Hydrologic forecasting textbooks.**—*M.R.*

10.7–13 551.593.5:551.574.1(02)

*†Shifrin, K. S., **Rasseianie sveta v mutnoĭ srede.** [Light scattering in turbid media.] Moscow, Gosud. Izdat. Tekhniko-Teoreticheskoĭ Lit., **1951.** 288 p. 77 figs., 28 tables, 128 refs., eqs. **DLC** (QC431.S55)—This small theoretical and practical text contains a wealth of applications to problems of optics important in meteorology and oceanography; especially those problems concerning cloud, fog or raindrop scattering ,or scattering in a hazy atmosphere or turbid sea. Tables of data and graphs show quantitative relationships depending on particle size, wave length of light, angle of incidence, etc. The several chapters deal successively with: 1) General aspects; 2) Basic formulas; 3) Refracted wave formulas; 4) Optics of small particles; 5) Of large particles; 6) Absorption and complete reflection of particles (small and large); 7) Transparent particles of any size; and 8) Particles with electromagnetic properties differing slightly from those of surrounding media. Appendix contains tables for calculating indices for particles in medium (between small and large) size range. *Subject Headings:* **1. Scattering of light textbooks 2. Optics of aerosols 3. Cloud physics.**—*M.R.*

10.7–14 519.2:551.58(02) 551.577.37

†Gumbel, E. J., (*Columbia Univ.*), **Statistics of extremes.** N. Y., Columbia Univ. Press, **1958.** 375 p. graphs, tables, eqs. Bibliog. (about 500 refs.) p. 349–371. Price: $15.00. **DLC**—A unique textbook for engineers, statisticians, meteorologists, hydrologists, climatologists, etc., giving in the simplest possible form the developments and applications of modern theory of extreme values needed for practical calculations of rare events. The eight major chapters cover: I. History, methodology and specific tools; II. Order statistics and their exceedances; III. Exact distribution of extremes; IV. Analytical study of extremes; V. The first asymptotic distribution; VI. Uses of the first asymptote; VII. The second and third asymptotes; and VIII. The asymptotic distributions of range and midrange, external quotients and geometric range. The only mathematics needed to use this book is simple "calculus, analysis statistics and probability theory." Graphical methods are used wherever possible. Useful nomograms and tables, and many practical illustrations from hydrology and climatology are plentiful. The excellent bibliography of >600 items covers most of the world's literature on application of theory of extreme values to meteorology and hydrology, etc. through 1956. In the climatological example on pages 341–344 (Washington, D. C. Dew Points 1905–45), the Jan. and July values are reversed on both the graph and in the tables and analysis. *Subject Headings:* **1. Statistics of extremes textbooks 2. Extreme value theory 3. Statistics in climatology 4. Flood frequency calculations.**—*M.R.*

10.7–15 551.5(02)

Hanzlík, Stanislav, **Základy meteorologie a klimatologie.** [Fundamentals of meteorology and climatology.] [New ed.] Prague, Československá Akademie Věd, **1956.** 321 p. 100 figs., 10 charts, 16 cloud photos, tables. **DWB** (M H252z 1956). **DLC** (QC855.H3)—The first edition of this popular text was published as an introductory part to the author's book **Podnebí a člověk** [Climate and man] in 1922. The second enlarged and revised edition was published in 1947 (*see* 4.10–16, Oct. 1953, *MAB*). The present edition includes minor additions. The book is intended as an introduction to meteorology rather than a comprehensive treatment of the field. For the latter purpose the author recommends M. S. Averkiev's book entitled **Meteorologiia** which was translated into Slovak by M. Končeк. *Subject Heading:* **1. Meteorology textbooks.**—*G.T.*

10.7–16 550.3(02)

†Magnitskiĭ, V. A., **Oznovy fiziki zemli.** [Fundamentals of geophysics.] Moscow, Izdatvo Geodezicheskoĭ Lit., **1953.** 290 p. 107 figs., 29 tables, 136 refs., numerous eqs. **DLC** (QC806.M2)—A standard textbook (10,000 copies) on geophysics of the solid earth for students of advanced courses in astronomy, geodesy or geophysics at universities or in training courses. Separate chapters cover systematically the origin and temperature of the earth, the figure of the earth, seismic phenomena, theory of elasticity, structure of the earth, density and elastic constants, structure and movements of the earth's core, gravitational fields, earth's structure, and modern theories of the earth's structure. *Subject Headings:* **1. Geophysics textbooks 2. Earth's core 3. Seismology.**—*M.R.*

10.7–17 551.5(02)

Willett, Hurd C. and Sanders, Frederick, **Descriptive meteorology.** 2d ed. N. Y., Academic Press, **1959.** 355 p. 70 figs., plate, eqs. Price: $7.50. **DWB**—The first edition, published in 1944 (*see* 4G–5, July 1953, *MAB*), has been brought up to date by inclusion of material on jet stream climatic changes, numerical prediction, weather control and upper air analysis by charts of baric topography, and revisions of the sections on tropical cyclones, vertical wind movements or eddies (lee waves), tornadoes, smog, nuclei, etc. Objective and statistical, short, extended and long range forecasting techniques are treated along with the more subjective methods, and verification by modern concept is considered. The 10 chs. cover: I. Structure and composition of atoms; II. Adiabatic processes; III. Heat balance; IV. Moisture balance; V. Kinematics (wind); VI. General circulation; VII. Secondary thermal circulation; VIII. Secondary dynamic circulations; IX. Local circulations and severe storms; X. Weather forecasting and modification. The book is intended, as was its predecessor, as a textbook of descriptive meteorology for students with general knowledge of calculus and college physics. The special aspects of physical meteorology on the one hand, and the practical aspects of synoptic meteorology such as map analysis or even observation, have been deliberately avoided. *Subject Headings:* **1. Descriptive meteorology textbooks 2. Atmospheric circulation.**—*M.R.*

10.7–18 551.58:72

†Olgyay, Victor and Olgyay, Aladar (*Princeton School of Architecture*), **Solar control and shading devices.** Princeton, N. J. Princeton Univ. Press, **1957.** 201 p. 180 figs., 50 refs., numerous illus. Price: £5. **DLC** (NA2540.04). Review by Ronald Frith in *Meteorological Magazine*, 87(1033):218, July 1958. Also: Review in *Royal Meteorological Society, Quarterly Journal*, 84(630):200, April **1958.**—This finely illustrated book discusses theoretical, technical and practical aspects of architectural design to make optimum use of artificial shade for greater comfort. Charts, tables, photographs and diagrams illustrate bioclimatic factors, astronomical factors, daylight illumination, shading by trees and vegetation, calculation of solar energy, effectiveness of shading devices, heat transmission of materials, and economy of devices treated in the technical section (Pt. 2). Charts and diagrams for calculation are given in the applications section (Pt. 3), and many fine photographs of actual architectural examples (in Pt. 4) of homes, sanitoria, office and factory buildings in all parts of the world (Brazil, Panama, Cairo, southern U. S., Finland, Japan, etc.), each with the applicable sun path diagram protractor to determine time and sun position when shading is needed. Calculation of solar energy can be made with either tabulated data, data taken from isorithm charts, or from the illustrated radiation calculators (direct, diffuse and total), for vertical or horizontal surfaces or from the spherical radiation calculator. *Subject Headings:* **1. Solar shading architecture 2. Sun path diagrams 3. Comfort charts 4. Radiation calculators 5. Architectural climatology.**—*M.R.*

10.7–19 551.507.362.2(02)

***Shternfel'd, A. A., Artificial satellites.** 2d rev. and extended ed. Moscow, State Publishing House for Technical and Theoretical Literature, **1958.** Transl. of the original Russian (**Iskusstvennye Sputniki,** pub. **1958**) prepared by Technical Documents Liaison Office, Wright-Patterson Air Force Base, Ohio. Distributed by U. S. Dept. of Commerce, Office of Technical Services, Wash., D. C. 424 p. 58 figs., 32 plates, 51 tables, 6 refs. Price: $6.00. **DWB**

(629.1388 S561isE, 1958). First Russian ed. with title **Iskusstvennye sputniki zemli,** issued Moscow, **1956** (*see* 10.1–32, Jan. 1959, *MAB*). Second ed. is greatly revised owing to launching of 2 Soviet sputniks in Oct. and Nov. 1957.—Laws of motion, rocket launcher, launching, construction of satellite, human problems, conditions as observed aboard a satellite, observation and communication from satellite, descent to earth, artificial moon, planet and solar satellites, use of satellites as observatories or stations in space, interplanetary flight and law are treated in separate chapters. Chapter on artificial satellites of other bodies in the solar system is new and accounted for omitting "earth" from title as in 1st edition. The work contains many tables of data and diagrams giving quantitative knowledge of mechanics and theory, as well as actual data from U. S. and U.S.S.R. sources. *Subject Headings:* **1. Satellite observatories 2. Translations.**—*M.R.*

10.7–20 551.5(02) 551.58(02)(47)

Kostin, S. I., **Osnovy meteorologii i klimatologii.** [Fundamentals of meteorology and climatology.] 4th ed. rev. and enl. Leningrad, Gidrometeoizdat, **1958.** 403 p. 143 figs. (1 incl. fold. map), tables+9 tables in appendix, 29 refs. **DLC** (QC861.K64 1958) (10,000 copies)—This 4th edition of a standard textbook for students in forestry and reclamation courses contains a great many revisions to bring it up to date from the 1955 edition. Some chapters have been shortened and others amplified, making an addition of 10 pages all told. The chapter on solar radiation has been rewritten by Iu. D. Ianishevskii and gives an excellent survey of both theoretical and practical instrumental and observational aspects of radiation balance. Soil temperature, evaporation, condensation, air currents, weather, weather forecasting, climatology, climatic elements and their distribution, climatic zones of the earth and, finally, climates of the U.S.S.R., by elements and by regions, form the major chapters, aside from the usual chapters on temperature, pressure, precipitation, etc. Effects of vegetation on weather and climate and of climate and weather on vegetation and animals are emphasized. (For 1955 3rd ed., *see* 7.9–3, Sept. 1956, *MAB*. For 1951 2d ed., *see* 4.4–8, April 1953, *MAB*.) *Subject Headings:* **1. Meteorology textbooks 2. Climatology textbooks 3. Climate of U.S.S.R. 4. U.S.S.R.**—*M.R.*

10.7–21 551.46(02) 551.48(02)

*Istoshin, Iu. V., **Okeanografiia.** [Oceanography.] [Rev. ed.] Leningrad, Gidrometeoizdat, **1956.** 303 p. 90 figs., 42 tables, 25 refs. **DLC** (GC11.I82)—A standard textbook on oceanography for hydrometeorologists and oceanography students, emphasizing the hydrographic aspects, geology, cartography, bottom features, physical features (optical, thermal, acoustical, electrical), chemistry (salinity, gases and suspended matter), temperature, density, thermal relations between oceans and continents, heat and water balance of oceans and seas, sea level, tides, currents, waves, ice, etc.; and regional characteristics of sea (Atlantic, Pacific, Indian, Arctic and bordering seas of each, plus a chapter on the Caspian and Aral Seas). In these chapters each of the main elements named above, plus marine biology of the ocean or sea, is taken up in consecutive sections. By comparison with the 1953 edition (*see* 6.5–6, May 1955, *MAB*) the text of this 1956 ed. has been reduced from 455 p. to 303 p., the illustrations from 120 to 90, and tables from 70 to 42 by deletion of Sec. 3 which dealt with methods of observation, instruments, and compilation of oceanographic and hydrographic data. However, much new material has been added, including 9 pages devoted to the International ice nomenclature (1956) with both the Russian and English terms, and a glossary of definitions in Russian of 96 ice terms, and a good subject index. *Subject Headings:* **1. Physical oceanography 2. Oceanography textbooks.**—*M.R.*

10.7–22 551.582.1(571)

*†Orlova, V. V., **Klimaticheskiĭ ocherk Barabinskoĭ nizmennosti.** [Climatic outline of the Baraba lowland.] Ed. by M. I. Budyko and T. V. Pokrovskaia. Leningrad, Gidrometeoizdat, **1954.** 235 p. 83 figs., 46 tables, 153 refs. **DLC** (QC990.R92B3)—This book (750 copies) presents a complete analysis of the climate and climatic data available for the Baraba lowlands, an area of 117,400 sq.km. in the Novosibirsk Oblast (between Omsk and Tomsk). Ch. I discusses climatic controls (physical-geographical characteristics, radiation factors, synoptic conditions). Ch. II discusses the climate and weather of the different seasons, with numerous

graphs, tables, wind roses, soil freezing, snow cover, isothermal and isohyetal charts, etc. Ch. III takes up the characteristic elements of the climate: Thermal regime, radiation balance, soil temperature, frost, precipitation, snow cover, humidity and evaporation, drought and dry winds, and wind regime. Ch. IV gives a summary of current ideas on climatic regionalization; principles and climate of the northern forest zone, the central forest steppe zone and the southwestern steppe region. Ch. V takes up the effect of conservation measures on the climate of the region. Appended are 60 pages of detailed tables of means and frequencies of the meteorological elements for upwards of 100 stations in the region. Not only decadal (10-day) but pentadal (5-day) values are given for temperature and precipitation, and diurnal variations in some of the elements are shown by tabulating the 7, 13 and 19 h. values. Days with fog, thunder and blizzards are given for a dozen stations. *Subject Headings:* **1. Climate of Baraba Steppe, U.S.S.R. 2. Soil temperature data 3. Snow cover data 4. Radiation data 5. Baraba Steppe, Novosibirsk Oblast, U.S.S.R. I. Budyko, M. I.** (*ed.*) **II. Pokrovskaia, T. V.** (*ed.*) —*M.R.*

10.7–23 551.5(02)

†Milosavljević, Marko, **Meteorologija.** [Meteorology.] 3d ed. Belgrade, Naučna Knjiga, **1956.** 365 p. 132 figs., 7 tables, 41 refs., eqs. **DLC** (QC861.M617 1956)—A standard textbook on meteorology. History, services, atmospheric structure and composition, radiative and heat energy exchange (sun-atmosphere-earth); temperature regime of atmosphere and earth; pressure, water vapor, evaporation, humidity; fog and clouds, precipitation; air movements and wind-analysis and forecasting are subjects covered. Conversion tables are appended. Emphasis is on instruments and methods of observation throughout the text. A few minor changes have been made in this edition over the 2nd (1953) edition. *Subject Headings:* **1. Meteorology textbooks 2. Bulgarian language.**—*M.R.*

10.7–24 551.582.1(573)

*†Mirotvortsev, Klavdin Nikolaevich, **Klimat Vostochnosibirskogo kraia.** [Climate of the East Siberia Region.] Irkutsk, **1934.** 206 p. tables, charts, 5 maps (fold.), 61 refs. **DLC** (QC990.R92F34)—A sizeable book giving an analysis of all available data for the East Siberian Region (N.W., N.E. and N. of Lake Baikal). Climatic characteristics, temperature, precipitation, cloudiness, sunshine, pressure and climatic conditions for agriculture (temperature, soil temperature, precipitation, snow, drought, absolute and relative humidity, hydrothermal coefficient), climatic and agroclimatic regions and, finally, climatic conditions of 63 administrative regions are taken separately with illustrative data for each. Appended are lists of 236 stations, a bibliography, tables of days with precipitation, snow depth, cloudiness, direction and speed of wind, soil temperature; and charts of climatic regions, snow depth, annual isotherms, Jan. and July isotherm degree days during vegetation period, frozen ground and climatic zones (according to Voznesenskiĭ-Shostakovich and Koloskov), and temperature regime diagrams for 3 stations. (*Same item as* 4C–176, March 1953, *MAB.*) *Subject Headings:* **1. Climate of East Siberia, U.S.S.R. 2. East Siberia, U.S.S.R.**—*M.R.*

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: **Differential kinematics** (Leese), 10.7–158; **Atmos. structure** (Byers), 10.7–184.

10.7–25 551.587:551.524.7

*†Goldie, N.; Moore, J. G. and Austin, E. E., **Upper air temperature over the world.** *Great Britain. Meteorological Office, Geophysical Memoirs,* No. 101, **1958.** 228 p. 22 figs., 75 plates, 9 tables, bibliog. of 30 refs. Appendix 2, **Sources of data** (76 refs.). **DWB, DLC**—This long-awaited monograph is one of the most important contributions to global upper air climatology of recent years and follows in the excellent tradition of the earlier monograph on upper air winds, *Geophysical Memoir,* No. 85, **1950** (*see* 4E–186, May 1953, *MAB*). The principal content is a series of world charts (Mercator projection, 75°N–60°S, paired with circumpolar azimuthal charts extending down to 55°N) of average temperature and standard deviation of the daily values, for each of the mid-season months and for the 700, 500, 300, 200

150 and 100 mb. levels. These are based on radiosonde data for 1941–52, supplemented by pre-war observations as necessary. Data sources are thoroughly documented; periods of record are given for the individual stations. Additional materials are included to facilitate the use of the charts, namely, graphs of the month-to-month variation of average temperature at 35 selected stations, to aid in interpolation of values between mid-season months; world charts of the average pressure and temperature of the tropopause (from *M.R.P.* 874, of the Met. Res. Comm.), to aid in interpolation between constant pressure surfaces at high levels: vertical temperature curves for selected stations representing different regimes; longitudinal cross-sections of average temperature along 80°W, 0°, 80°E, 140°E; and a world chart of absolute minimum temperature in the vicinity of the tropopause. A discussion of the statistical character of upper air temperature distributions and of the degree of confidence which may be placed on the assumption of a Gaussian normal distribution is included, along with details of the reliability of the charts in specified areas. *Subject Headings:* **1. Upper air temperatures 2. Global upper air climatology.**—*R. S. Quiroz.*

10.7–26 551.571.1:551.573

*†Ivanov, Nikolaĭ Nikolaevich, **Atmosfernoe uvlazhnenie tropicheskikh i sopredel'nykh stran zemnogo shara.** [Atmospheric moisture in tropical and adjacent countries.] Leningrad, Akademiia Nauk SSSR, **1958.** 311 p. 598 figs., 14 maps (fold.), tables, bibliog. p. 165–176. (*Geograficheskoe Obshchestvo SSSR, Zapiski*, n.s., Vol. 18). **DLC** (QC915.185). **DWB** (M71.2 193aT).—An elaborate study (1700 copies) accompanied by extensive tables of climatic data, and large colored folded charts, of the rainfall, evaporation and moisture balance of the tropics, and of individual continental and island regions in the tropics or subtropics (35°N. to 35°S). The eight main chapters cover: 1) General laws of distribution of precipitation in warm regions—effects of temperature, circulation, relief, ocean currents, vegetative cover, etc. on precipitation regime; 2) Annual precipitation regime and types; 3) Amplitude of seasonal variation of precipitation; 4) Potential evaporation; 5) Coefficient of local effective precipitation; 6) Annual moisture regime; 7) Moisture balance and 8) Climatic classification according to the annual regime of atmospheric moisture balance. A bibliography of about 400 references to Russian and non-Russian (half and half) literature on precipitation, effective precipitation and evapotranspiration, is included. Tables for 600 selected stations in all parts of the earth, systematically arranged data for tropics are appended along with graphs for nearly 300 selected stations showing seasonal distribution of dry, moist periods and other factors of moisture balance. *Subject Headings:* **1. Moisture balance of tropics 2. Precipitation data for tropics 3. Evaporation charts for tropics 4. Tropics.**—*M.R.*

10.7–27 551.511.3:551.509.313

Edelmann, Winhart, **Vergleich verschiedener nichtgeostrophischer Modelle der Atmosphäre mit Hilfe von Lösungen der linearisierten Modellgleichungen.** [Comparison of different nongeostrophic atmospheric models with the aid of solutions of the linearized model equations.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 6(1), **1958.** 215 p. 50 figs., 26 refs., 144 eqs. Biog. sketch appended. **DWB.** English version issued as Germany. Deutscher Wetterdienst, Contract AF 61(514)-735 C, Technical (Final) Report, June 30, **1957.** Sec. 5 (150 p.). 50 figs., 26 refs., 144 eqs.—A sizeable monograph developing in detail linear equations for a non-geostrophic model of the atmosphere. As yet, these equations have not been sufficiently linearized or simplified to allow their use in electronic computers. The general problem is first outlined; in Ch. II the physical basis (equations of state, continuity, etc.) is discussed; in Ch. III the meteorological equations (geostrophic vorticity, divergence, adiabatic and boundary conditions); IV—the various 3-dimensional models (geostrophic, Philipps, Thompson, Hollmann, advection, etc.); V—linearized model equations, their integration and energy considerations; VI—time dependent solutions in barotropic flow; VII—tendency circulations for initially barotropic perturbations in a baroclinic current; VIII—time dependent 3-dimensional solutions in baroclinic flow; IX—General time dependent solutions for 2-layer models in baroclinic flow. Models are shown graphically as well as mathematically. *Subject Headings:* **1. Nongeostrophic models of atmospheric flow 2. Numerical prediction models.**—*M.R.*

10.7–28 551.515.13(469):551.513.73:551.589.1

†§Groening, Hans Ulrich, **Azorentiefs: synoptische Untersuchung über ihre Entstehung und die atlantisch-europäische Grosszirkulation bei tiefem Luftdruck im Azorenraum.** [The Azores lows: a synoptic investigation of their origin and the Atlantic-European general circulation during low pressure in the Azores Area.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 5(1), **1957.** 77 p. 41 figs., 4 tables, 51 refs. **DWB**—A thorough climatological-statistical-synoptic study of the anomalous but important situation called the Azores Low, which occurs several times each year and may persist for a week as a result of blocking. The causes, frequency, persistence, associated pressure conditions and circulation types, trajectories, unusual trajectories, synoptic case histories of typical occurrences and extreme cases in recent years (1949–54) illustrated by well analyzed surface and 500 mb. charts, tropical storms as Azores Lows, effects on Atlantic and European weather and circulation, etc. are reviewed. The most persistent case in recent years was Nov. 23 to Dec. 4, 1950, and the most severe on Feb. 28, 1952. These Azores Lows originate, as a rule, on an intensifying frontal zone south of Iceland, or cut-off cyclogenesis, and usually with meridional circulation. A frequent type involves a warm blocking high south of Greenland-Iceland, and a cold cut-off low south of the blocking high. *Subject Headings:* **1. Azores Low 2. Synoptic climatological studies 3. Synoptic case history studies 4. Blocking in Atlantic 5. Azores region.**—*M.R.*

10.7–29 551.46(265/266)

*†Muromtsev, Alekseĭ Mikhailovich, **Osnovnye cherty gidrologii Tikhogo okeana.** [Basic features of the hydrology of the Pacific Ocean.] Leningrad, Gidrometeoizdat, **1958.** 629 p. 88 figs., numerous tables (p. 303–631), 200 refs. At head of t-p: Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby . . . Gosudarstvennyĭ Okeanograficheskiĭ Institut. Also Idem, . . . **Prilozhenie II, Atlas vertikal'nykh razrezov i kart temperatury, solenosti, plotnosti i soderzhaniia kisloroda.** [Appendix 2, Atlas of vertical cross sections and charts of temperature, salinity, density and oxygen content.] Issued **1958.** 124 p. 177 diagrs. Both **DLC** (GC286.M85). Review by S. D. Osokin in *Priroda*, Moscow, No. 8:119–121, Aug. **1959. DLC**—A magnificent analysis and compilation (900 copies) of all available oceanographic or hydrographic data for the Pacific Ocean obtained between 1804 and 1955. Time and space variations of temperature, salinity, density and oxygen content, and their vertical distributions or gradients are analyzed. Water masses and circulation factors of the Pacific are also analyzed. Only data for the open Pacific (not the bordering seas) are compiled. The first 300 (large) pages consist of text, selective analytical tables, charts and cross sections, and an excellent bibliography of Russian and western literature on all aspects of Pacific oceanography. The last 330 pages consist of extensive tables of the above named elements by ocean squares and depths, with dates of expedition cited in each case. A catalogue giving in detail the names, dates, country, depths and elements observed on several hundred expeditions, arranged by ocean squares, is found on p. 36 to 101. Data are compiled by machine wherever possible. Measurements made in period 1804–1873 are catalogued separately. Separate chapters cover: 1) History of oceanographic surveys of Pacific; 2) Sources and methods of statistical compilation; 3) Temperature; 4) Salinity; 5) Density; 6) Oxygen content; 7) Classification of water masses; 8) Circulation scheme of Pacific. Appendix I is the data, and Appendix II an atlas of vertical cross sections and charts of temperature, salinity, density and oxygen content. Most of the surveys were made by the U. S., British or Japanese vessels, but much of the systematic data is from the expeditions of the "Vitiaz" in 1951–55, especially, to great depths in the North Pacific. *Subject Headings:* **1. Oceanography of Pacific Ocean 2. Oceanographic data, Pacific Ocean 3. "Vitiaz" cruises, 1951–1955 4. Pacific Ocean.**—*M.R.*

10.7–30 551.58

†Landsberg, H. E. (*U. S. W. B., Wash., D. C.*), **Review of climatology (1951–1955).** *Meteorological Monographs* (American Meteorological Society), Boston, 3(12–20): 1–43, July **1957.** 2 figs., 24 tables, bibliog. p. 38–43. **DWB, DLC**—A comprehensive and critical review of the published literature in the field of climatology during the period 1951–1955. Beginning with a review of the status and problems of climatology as reviewed in the **Compendium of Meteorology,** the author proceeds to examine the advances and other developments in various aspects of the field from the period covered by the **Compendium** up until 1955. The subjects covered include the following: textbooks; bibliographies; climatological charts and atlases;

climatic classifications; regional climatology; climatic summarizations and compilations; the climatology of special observatories (radiative temperatures, dew, precipitation, atmospheric chemistry, etc.); methodology and statistical procedure (extreme values, determination of solar radiation intensity from sunshine duration, etc.); theoretical climatology; energetic climatology (radiation balance); circulation climatology; contemporary climatic variations; changes in circulation and climatic trends and curves of climatic change; synoptic climatology, including weather types and climate singularities and climate; applied climatology with special reference to forecasting; climatic data for industrial, agricultural and military operations; the use of climatological records as criteria for man-made influence on weather (artificial precipitation, atomic cyclones, etc.); housing climate; urban climate; climate and soil mechanics microclimatology; climatic effects of vegetation; and climatic effects upon human beings. The line of future progress in climatology is discussed. *Subject Headings:* **1. Climatology 2. Review articles.**—*I.L.D.*

10.7–31 551.515.13:551.589.1

†Weimann, Wolf Ulrich, **Die Kaltlufttropfen zwischen Felsengebirge und Ural: Klimatologische und synoptische Untersuchungen für den fünfjährigen Zeitraum März 1951 bis Februar 1956.** [Cold pools between the Rocky Mountains and the Urals: climatological and synoptic studies for the 5-year period from March 1951 to Feb. 1956.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 6(3), **1958.** 34 p. 8 figs., 8 charts, 6 tables, 43 refs. Biog. sketch appended. (Dissertation, Ph. D., Berlin Freie Univ.) **DWB**—Kaltlufttropfen (term first used by SCHERHAG in 1937) or cold pools, cold air drops, cold drops, cut-off lows, upper level cold lows or cold vortexes (as various authors have translated the term into English or designated the same, or nearly the same, phenomena appearing on a chart of relative topography), are discussed, and their frequency in time (months and years from 1951–1956) and space (along a wide band from the Rocky Mts. of the U. S. to the European-Asiatic boundary) tabulated and analyzed. Individual cases in the different seasons and geographic areas are analyzed and shown on trajectory charts for each season, and on an integrated and simplified trajectory chart. The relation between method of origin and ultimate intensity or region, or season, types, life histories, departures of mean relative topography (normal and extreme values), and a more detailed synoptic analysis of Kaltlufttropfen genesis over southeast Europe with color charts of surface and relative (500/1000 mb.) and absolute (850 mb.) topography are included with a good list of references on the subject. A marked regional concentration is found to exist in each season, the cold pools being especially frequent in the Hudson Bay and in the central or southeast European regions. *Subject Headings:* **1. Kaltlufttropfen 2. Cold pools.**—*M.R.*

10.7–32 551.509.617(494):551.578.7

*Switzerland. Eidg. Kommission zum Studium der Hagelbildung und Hagelabwehr, **Grossversuch III zur Bekämpfung des Hagels im Tessin, 1. Versuchsjahr.** [Project 3 for hail control in Tessin, 1st year of experimentation.] Its *Tätigkeitsbericht*, No. 10, **1957.** 11 p. maps, numerous tables. **DWB**—As in previous years (for reports covering the 1953–1956 seasons, *see* 6J–338, Oct. 1955; 8.7–24, July 1957 and 9.2–35, Feb. 1958, *MAB*), hail prevention experiments were continued by means of ground-operated silver iodide generators. The area of coverage was extended to include not only the Magadino Plain as heretofore, but the entire Tessin south of the Bellinzona-Cardada-Gridone line. The number of generators used was increased to 20. Another change was the conducting of operations according to a statistical evaluation scheme developed (and discussed in this report) by P. SCHMID. Results of the operations are described and illustrated in the same detailed manner as in previous reports. Due to the paucity of data, no definite conclusions can be drawn either of a positive or negative effect, or of no effect of AgI seeding upon hail formation, but a definite positive correlation appears to exist between AgI seeding and precipitation intensity (the ratio of precipitation amounts per unit time on unseeded and seeded days was 1/2). Thus it can be safely assumed that AgI smoke reaches effective levels under orographic conditions. Experiments are expected to be continued for several years before their final statistical evaluation can be undertaken. *Subject Headings:* **1. Hail prevention in Switzerland 2. Cloud seeding with silver iodide 3. Tessin, Switzerland. I. Sanger, R. II. Thams, J. C. III. Schmid, P.**—*G.T.*

10.7–33 551.526.8(572)

†*Rossolimo, L. L., **Temperaturnyĭ rezhim ozera Baĭkal.** [Temperature regime of Lake Baikal.] *Akademiia Nauk SSSR. Baĭkal'skaia Limnologicheskaia Stantsiia, Trudy*, Vol. 16, **1957.** 551 p. 313 figs., 119 tables, 47 refs. At head of t-p: Akademiia Nauk SSSR. Vostochno-Sibirskiĭ Filial. **DWB** (M26.8 R838te), **DLC** (DK771.B3A18)—A huge book containing a compilation of all available data on the temperature of different parts of Lake Baikal down to 300 m. during the ice season, spring, summer and autumn, with hundreds of cross sections or profiles, tables of data and examples of unusual, as well as mean, conditions in the open lake and in shore or bay sectors taken individually. Time sequences, year-to-year variations, effect of ice cover, etc. are given. A previous work by L. F. Forsh on surface temperatures of Lake Baikal was published by the Baikal Limnological station in its *Trudy*, No. 15, **1957,** with data for 1896–1945 included in analysis. A history of studies and observations on temperature of Lake Baikal is found on p. 9–27, and methods set forth in ensuing pages. *Subject Headings:* **1. Temperature of Lake Baikal 2. Lake temperature surveys 3. Limnology 4. Lake Baikal.**—*M.R.*

10.7–34 551.577(678.2)

*Otnes, Jacob (*U. N. Food and Agric. Org.*), **Rainfall analyses in the Rufiji Basin.** *East Africa High Commission. Rufiji Basin Survey. Hydrological Section, Progress Report*, No. 4, Sept. **1957.** 57 p. 12 figs. (incl. fold. map), 14 tables, 3 foot-refs., 13 eqs. Reproduced from typescript. **DWB** (M79.4 E13pr)—Rainfall data for stations in the Rufiji Basin, Tanganyika (5°32′ to 10°44′S, and 33°32′ to 39°25′E), are thoroughly analyzed and presented in graphs and tables of extreme, quantile values and accumulated values. Interstation correlations and probabilities are also shown graphically and in tables, and data for isohyetal maps are computed. River gaging stations were first established in the Rufiji Basin in 1954. By the end of 1956 there were 50 stations. No rain gages at first in the southern part and records are sparse in the western part of the Basin. Of 82 stations in the Basin, only 44 have over 10 yrs of record and 14 stations for 15 yrs or more. Mahenge has 42 years of record and 7 others have over 25 yrs. *Subject Headings:* **1. Rainfall data for Rufiji Basin, Tanganyika 2. Rainfall probabilities 3. Rufiji Basin, Tanganyika.**—*M.R.*

10.7–35 551.515.23(265/266)

†Ramage, C. S., **Hurricane development.** Hawaii. Univ. Institute of Geophysics. Meteorology Div., Contract AF 19(604)-1942, Scientific Report, No. 3, June **1958.** 30 p. 10 figs., table, 40 refs. **DWB** (M(055) H389sc)—Statistics on the frequency of typhoons or hurricanes in the 12 specified sectors of the world's oceans show that three times as many hurricanes develop in the western North Pacific as in any other region. The anomaly is accredited to a vigorous trough at 200 mb, extending from Alaska to Indonesia in a N.E.–S.W. direction, there being no similar features anywhere else in the tropics. The other requirements for hurricane development are specified and each region examined to see how these requirements are fulfilled and to account for the development or suppression of cyclones. The unusual development of cold core "Kona" cyclones into a warm core tropical storm and occasionally into hurricanes, and the forces which trigger hurricanes are discussed and analyzed. Super typhoons, such as "Wanda" (July 1956) and their generating mechanisms are discussed and illustrated. It is concluded that Riehl's development model does not fit these cases of intense development. *Subject Headings:* **1. Hurricane development areas 2. Hurricane development models 3. Typhoon "Wanda" (1956) 4. Western North Pacific.**—*M.R.*

10.7–36 551.510.528:551.509.317

†§Stinson, James Robert, **Characteristics, analysis, and uses of tropopause charts.** Pub. **1958.** Thesis (Ph.D.)—St. Louis Univ. 110 p. 32 figs., 78 refs., 9 eqs. (Biog. sketch p. 108–109). **DWB** (M10.528 S859ch)—The nature of the tropopause (warm stratospheric sinks and cold crests, jet streams cores, ribbons, tropical and polar tropopauses, mid-latitude and thermal wind tropopause), the tropopause above regions of strong 500 mb winds, constant pressure cold rims at tropopause, tropopause slope, tropopause chart analysis and use of

tropopause chart in forecasting are treated in detail. Conclusion is that a thermal wind tropopause can be determined for any given situation which is unique (single valued and continuous). The thermal wind tropopause chart is especially useful in that steep gradients correspond to jet streams. The tropopause never intersects the ground or gets above the reach of normal soundings, and shows continuity in space and time. Charts can be used in hurricane or typhoon, severe storm and cold wave forecasts. The surfaces are very sensitive to thermodynamic changes in the tropopause. *Subject Headings:* **1. Tropopause chart analysis 2. Thermal-wind tropopause charts 3. Tropopause forecasting.**—*M.R.*

10.7–37 551.582.1(498)

*Stoenescu, St. M., **Clima Bucegilor.** [Bucegi climate.] *Romania. Institutul Meteorologic Central, Memorii si Studii*, 4(1):**1951.** 210 p. 185 figs., 99 tables, 22 refs. **DWB** (M82.1/498 S872cL)—This monograph contains an elaborate graphical and statistical analysis of the available climatic data for the Bucegi range of the E. Carpathians in Romania (a mountainous region at elevations ranging from 750 m to 2500 m) including frequency diagrams and tables for temperature, pressure, wind, vapor pressure, relative humidity, cloudiness, sunshine, precipitation, snow, hydrometers and synthetic climatology. The regional factors are discussed and illustrated in the first chapter. Data for a score of stations in the area are used in the analysis. The longest record is for Sinaia at 872 m (1887–1945). Wind roses, diurnal and interdiurnal variability graphs, frequency distribution tables of temperature, histograms of precipitation, vapor pressure, cloudiness, etc. are among the many excellent presentations. *Subject Headings:* **1. Climate of Bucegi, Romania 2. Romanian language 3. Bucegi, Romania.**—*M.R.*

10.7–38 551.506:551.55:629.13(73,261,265/266)

*U. S. Weather Bureau, **Tables of winds and their aiding and retarding effect at 850, 700, 500, 300 and 200 mb.** *U. S. Office of Naval Operations, NAVAER* 50-1C-526, (**1954**). 3 vol. figs., tables, maps. Vol. 1, **Introductory text and tables for North Pacific area.** 275 p. Vol. 2, **Tables for North Atlantic area.** 261 p. Vol. 3, **Tables for United States air routes.** 368 p. **DLC** (TL557.A5U53)—Voluminous tables of data for the North Pacific, North Atlantic and U. S. air routes, lists of stations in these areas from which data were computed, methods of computation of wind aid-retard tables, application of tables and a list of routes, are included in these three volumes. Wind components of aircraft ground speed in terms of percentage frequency of aid or retard, are given for points and for routes for 850, 700, 500, 300 and 200 mb levels for winter, spring, summer and autumn, respectively, for 200, 300, 400, 600, and 1000 kn. aircraft speed. Tables for the U. S. were based on rawin data for 43 stations for 1947–1952, and gradient wind data for 2 stations, for the North Pacific data for 33 stations (1948–1953), and for the North Atlantic for 32 selected locations (1948–53). *Subject Headings:* **1. Wind aid-retard tables 2. Air navigation aids 3. United States 4. North Atlantic 5. North Pacific.**—*M.R.*

10.7–39 551.510.3:551.507.362.1:551.524.7

Jones, L. M. and Bartman, F. L., **A simplified falling-sphere method for upper air density.** Michigan. Univ. Engineering Research Institute. Contract AF 19(604)-999, Technical Report [unnumbered], June **1956.** 89 p. 52 figs. (incl. photos), 4 tables, 16 refs., 56 eqs.—Design and construction details are presented extensively for the falling sphere, its instrumentation, launching and the results of 2 soundings, such as are contemplated for synoptic surveys, one on April 8, 1955, and one on June 24, 1955. Sphere ejection occurred at 174,000 ft and 182,000 ft, respectively, and rockets reached 356,000 and 320,000 ft. Soundings were made with a 2 stage (Nike-Deacon) rocket, at Wallops Island, Va. Calculations of the sphere trajectories (sphere altitude vs. time, sphere altitude vs. horizontal range and velocity component vs. time), shown on graphs, indicate deviation of trajectory using measured drag accelerations from that using NACA estimate for nose cone trajectory and radar data. Air densities and temperatures are also worked out to 260,000 and 228,000 ft, respectively, and compared graphically with standard values. *Subject Headings:* **1. Falling sphere soundings 2. Upper atmosphere temperature and density 3. Nike-Deacon rocket soundings.**—*M.R.*

10.7–40 551.586:62

Fritsche, O. and Kahl, W., **Tropenschutz elektrotechnischer Erzeugnisse.** [Protecti of electrotechnical devices against tropical climate.] Berlin, Verlag Technik, **1958.** 132 74 figs., tables, 15 refs. "Articles previously published in *Deutsche Elektrotechnik*, 195 **1957.**" **DLC** (TK453.F7)—Dry and wet tropical climates are discussed in relation to th effect on electrical equipment. Laboratory simulation of these conditions was obtained means of tropical chambers, and the results of tests on different materials, for varying perio up to 100 days, shown in tables and on curves. Humidity appears to be the critical factor most instances. Examples are given from laboratory and field experience, and for both packi or crating materials, and the metallic equipment itself. Methods of protection against tropic environments are treated at some length. *Subject Headings:* **1. Deterioration of materials tropics 2. Tropical climate test chambers 3. Climate control chambers.**—*M.R.*

10.7–41 551.510.42:0

†**Clean Air Year Book, 1958.** 64 p. [An annual issued by the National Society for Clea Air, Palace Chambers, Bridge Street, London, S.W. 1. Price: 2 sh.] **Major smog disaster** p. 20. **Recent papers and reports: a selected list,** p. 23–25. **Guide to publications** (availab books, reports and pamphlets on smoke prevention, etc.), p. 26–30. **Directory of organizatio** p. 30–32. **DWB** (M10.42 C723)—The word "smog" was first used by H. A. Des Voeu founder and president of the National Society against Smoke, in 1905. Fatal incidents London, Glasgow, Manchester, the Meuse region and Donora from 1873 to 1956 (6 out of were in London) are listed. The 1952 disaster in London was considered the worst, with 40 additional deaths due to smog. A chronological history of air pollution in Great Britain found on p. 21–22, and a classified list of 59 references to recent works on air pollution a control is found on p. 23–25, and scores of other reports and books available at the Society c p. 26–30. *Subject Headings:* **1. Smog disasters 2. Air pollution bibliographies.**—*M.R.*

10.7–42 551.582.1(584.

*§Aĭzenshtat, Boris Abramovich, **Klimaticheskoe opisanie Golodnoĭ Stepi.** [Climat description of the Golodnaya Steppe.] Leningrad, Gidrometeoizdat, **1958.** 73 p. 15 figs 59 tables. **DLC** (QC990.R92G6)—A pamphlet giving a thorough analysis of the availab climatic data for the Golodnaya Steppe region of Kazakstan, south of the Caspian Sea. Da for 11 stations in the area were used in most cases. General climatic controls, general a local wind and gale frequencies by seasons, typical storm conditions (with synoptic examples dust storm frequencies, temperature, frost (absolute and relative), humidity, cloud, sunshin solar radiation, precipitation, snow, snow cover, fog, thunderstorms, glaze, soil temperatur regime (4 stations), drought and dry winds, microclimatic control by artificial means an local climatic peculiarities of the Golodnaya Steppe area are presented. Data for Tashken are used wherever data for the imminent area are not available (e.g. radiation and sunshi data). *Subject Headings:* **1. Climate of Golodnaya Steppe, U.S.S.R. 2. Climatic handbook of U.S.S.R. 3. Soil temperature data 4. Golodnaya Steppe, Kazakstan S.S.R.**—M.R.

10.7–43 551.578.46:63(477

*Akademiia Nauk SSSR. Institut Geografii, **Rol' snezhnogo pokrova v zemledeli** [Role of snow cover in agriculture.] Moscow, **1953.** 110 p. 4 figs., 7 tables. **DL** (S594.A4)—This pamphlet contains 4 articles on use and control of snow cover in obtainin high crop productivity, and on measurement of snow cover, and snow melt in the Desna Basi Snow cover is considered to be one of the great natural resources of the U.S.S.R. because of it ability to conserve the soil moisture and compensate for lack of precipitation in semi-ari regions, and to prevent deep soil freezing or freezing of winter crops. All 4 articles contai statistical data (some under controlled conditions) on crops, soil temperatures, snow depth duration of snow cover for different years and regions, regions where snow is ample and do not need conservation, effect of relief and forests or steppe, and water content of snow. *Subje Headings:* **1. Snow conservation 2. Snow cover effects on crops 3. Snow surveys in U.S.S.R 4. Desna Basin, European U.S.S.R. I. Rikhter, G. D.** (*ed.*) **II. Shul'gin, A. M. III. Ma gomedov, A. D.**—*M.R.*

10.7–44 551.501.9

Lahaye, Edmond, **Réalisation du Centre de Physique du Globe à Dourbes.** [Realization of the Center for Physics of the Globe at Dourbes.] *Belgium. Institut Royal Météorologique, Publication, Série A*, No. 7, **1958.** 104 p. figs., photos, color plates. **DLC**—This work, subdivided in 7 ch., supplies a detailed description of the Center for Physics of the Globe, set up at Dourbes by the Royal Meteorological Institute of Belgium. This Center, which was planned and realized through the efforts of the author, constitutes a remarkable achievement, unique in Europe and perhaps in the world. Situated on the grounds of the Center, which extend over more than 52 hectares, are 14 buildings. Those for scientific purposes are strictly adapted to the instrumental equipment they enclose. The activity of the Center is devoted to the observation and study of numerous phenomena of geophysics, depending on several scientific branches: earth magnetic field, earth currents, ionosphere, cosmic radiation, spectroscopy of nocturnal sky glows and, occasionally, auroras, atmospheric electric field, fireless emissions of thunderstorms sources and tropospheric propagation, radioactive content of air and precipitations, atmospheric chemistry, solar radiation, meteorology and seismology. Two maps give a description of the appearance of the site and the topography of the region. Different folding plans supply clear information on the buildings, their fittings and the location of the scientific equipment. Numerous photos indicate the importance of the scientific equipment and enable the reader to get an idea of the different instruments. Several magnificient color plates concerning the site and the different buildings, are included in this important work. *Subject Headings:* 1. **Geophysical observatories** 2. **Dourbes, Belgium.**—*A. V.*

ATLASES AND MANUALS

10.7–45 551.582.3(437)

Czechoslovakia. Ústřední Správa Geodesie a Kartografie, **Atlas podnebí Československé republiky.** [Climatic atlas of Czechoslovakia.] Issued Prague, **1958.** 13 p. of text. 87 maps and charts (fold. in color) arranged in 6 subject groups (Scale 1–1,000,000. Loose leaf. Available for reference only. **DWB** (M82.3/437 C998at)—This elegant and voluminous atlas contains extensive text describing the charts, and large folded color charts of the main climatic and phenological elements; plus a physiographic, a hydrologic, a soils, a forest type and a climatic classification (Konček system) chart. Monthly mean charts of air temp., charts of first and last days and duration of 0°C, 5°C, 10°C, 15°C, summer days and ice days (31 charts in all), 24 charts of rainfall and days with rain, 15 charts of sunshine, cloudiness, relative humidity and wind direction and speed; 12 phenological charts for different trees and crops; and 24 graphs of soil temp. and associated weather for various stations are included. Some of the charts show great detail in analysis; others, where the data are scarcer or the intervals too broad, show little detail and might better have been put on smaller-scale, less cumbersome charts which would facilitate comparison from month-to-month or season-to-season. In general, the quality of the analyses, and of course the cartography and reproduction, is excellent, the general topography of the country being used in the interpretation. Text gives credit to compiler of each chart or series of charts, period of record, formulas used and other annotations. *Subject Headings:* 1. **Climatic atlas of Czechoslovakia** 2. **Phenological charts** 3. **Czechoslovakia. I. Czechoslovakia. Hydrometeorologický Ústav II. Veselcký, Antonín,** (*ed.*) **I. Konček, Mikuláš.**—*M. R.*

10.7–46 551.521.18

*†Migeotte, M.; Neven, L.; Swensson, J., **The solar spectrum from 2.8 to 23.7 microns, Pt. 1, Photometric atlas.** Liège. Université. Institut d'Astrophysique (and) Belgium. Observatoire Royal de Belgique, Contract AF 61(514)-432, Technical Final Report, Phase A, Pt. 1, **1956.** unpaged. 6 figs., 118 charts, tables, 14 refs. 30 cm × 60 cm. Text in French and English. **Pt. 2, Measures and identifications** (by same authors), **with Comments on the spectra of telluric H_2O and CO_2 as observed in the solar spectrum 2.8–23.7 microns** by W. S. Benedict (*Johns Hopkins Univ.*) *Ibid.*, Technical Final Report, Phase A, Pt. 2, **1957.** 30 p. of text. Numerous tables. 51 refs. These reports are reprints of *Société Royale des Sciences de Liège, Mémoires*, Special Volume (Hors Série), No. 1, **1956** and No. 2, **1957,** respectively. **DWB** (P S658vh)—The large atlas gives 123 solar spectra between 2.8 and 23.75μ obtained

since 1942 at the Sphinx Observatory on the Jungfraujoch (3580 M.) with a coelostat a spectrograph from University of Liège. The plates are actual photographic reproduc only slightly reduced (4/5). Site, equipment, observing conditions, etc. are describe text and illustrated by large, excellent photographs. *Subject Heading:* **1. Solar inf spectra atlases.**—*M.R.*

10.7–47 55

*Ivanov, Nikolaĭ Nikolaevich, **Mirovaia karta ispariaemosti.** [World evaporation ch Leningrad, Gidrometeoizdat, **1957.** 3 tables, 16 refs. **DLC** (QC878.I85)—The explan pamphlet which accompanies the world "evaporability" chart (750 copies published) into the physical theory and practical significance of evaporability, explains the map in c (and how it was constructed), and goes into the various peculiarities of the evaporation re in the U.S.S.R., Western Europe, Asia (outside U.S.S.R.), Australia and the East In Africa, North America, and South America. Annual potential evaporation ranges from mm in the extreme Arctic and cold poles to >5250 mm. in the heart of the Sahara. C variations occur on the same continents and even in the same climatic "zones." For exar in Death Valley, Calif. it exceeds 3700 mm., and on the California Coast <375 mm., a the Cascades <250 mm. The world chart, on a 1:65,000,000 scale, was compiled by redu of a 1:4 to 1:15 million chart on which data from 2700 points were plotted. Monthly t were used in obtaining the annual values (in mm.), and a comparison is made between res using the author's formula and those of Davydov (1944), Zaikov (1949), and Braslov (1954). At 9 coastal points the author's values differed <3% from the average of the ot and at 9 interior points not >5%. The mean latitudinal evaporation by 5° parallels continental areas from 0 to 80°N and 0 to 55°S is given in a table, and the same for 16 "natu zones (snow and ice, tundra, forest tundra, taiga, podzol, forest-steppe, etc.) on 5 contine areas are tabulated. *Subject Headings:* **1. Evaporability map of world 2. Potential evap tion charts.**—*M.R.*

10.7–48 551.586:632.187

U. S. National Park Service, **Handbook for fire lookouts. (1958?).** ch. and ann separately paged. 73 figs. loose-leaf. **DWB** (634.96 U584ha)—A large volume of informa on duties and equipment for fire lookouts (mainly on mountain peaks) in the U. S. is colle and arranged systematically in this manual. Chapters are included on: 1) The observer his training, 2) Map reading, 3) Learning the country, 4) Operating the fire finder, 5) System observation (including lightning storms and visibility), 6) Locating and reporting fires, 7) C munications (including effect of lightning storms on radio equipment), 8) General (fire vention, visitors, safety, maintenance of quarters, reports and records, fire weather U. S. W. B. fire weather services). Appendices include a section on weather and clouds (cl photographs for identification, upper air clouds, subsiding air conditions, vertical motio cloud, and a map of U. S. showing fire weather forecast districts and headquarters). *Su Headings:* **1. Forest fire lookout manuals 2. Fire weather service.**—*M.R.*

10.7–49 551.582.2(788)

*Thompson, Will F. and Dodd, Arthur V., **Environmental handbook for the Camp H and Pikes Peak areas, Colorado.** *U. S. Quartermaster Research and Engineering Cen Environmental Protection Research Div., Technical Report,* EP-79, Jan. **1958.** 86 p. 49 (incl. 2 fold. maps), 7 tables. Bibliog. p. 54–56. **DWB** (M86 U585t No. 79)—Stand description of topography, soils, vegetation and climate of the Camp Hale Military Reservat (at 9250 ft), and the Pikes Peak mountain training area (at 9000–11,000 ft) in Colorado, a a comparison with other mountain areas in the world. No glaciers are present but b areas have cliffs, bogs, flats, rocky soil, meadow grass, spurce, fir and aspen forests, sagebr and deep winter and spring snow cover. Simple climatic data (mean and extreme ten snowfall, precip. and sky cover) are presented for a few stations in Colorado near the si Data are given in tables and histogram graphs. *Subject Headings:* **1. Climatic data for Ca Hale, Colo. 2. Climatic data for Pikes Peak training area, Colo. 3. Environmental ha books for army training sites 4. Central Colorado.**—*M.R.*

10.7–50 551.5:629.13(02)

Taylor, George Frederic, **Aeronautical meteorology: a study guide to be used with USAFI course MC 701 or CC 701.** Englewood Cliffs, N. J., Published for the U. S. Armed Forces Institute by Prentice-Hall, **1957.** 136 p. illus. (*U. S. Armed Forces Institute Study Guide*, MC 701.1.) **DLC** (TL556.T352)—An elementary correspondence course in meteorology for pilots; observing, forecasting and interpretation, weather reports and maps. Although the general chapter headings are much the same as in other meteorology texts, there are sections and illustrations devoted to modern aspects, such as rockets, the exosphere, ozonosphere, importance of tropopause in jet flights; some of the particular subjects such as tornadoes, sferics, thunderstorm electricity, radar, pyrheliometers, geostrophic wind, cold core lows, pressure pattern flight, streamline analysis, jet stream; types, mechanics and meteorology of aircraft icing, tropical weather, etc. Each chapter contains a page or so of "self examination" questions and another page of "written assignment." A few good photographs and a number of line drawings, schematic diagrams, charts and tables illustrate the processes or techniques. *Subject Headings:* **1. Aeronautical meteorology textbooks 2. Correspondence course manuals.**—*M.R.*

10.7–51 551.501.1:63(02) 551.506.8

U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, **Nastavlenie gidrometeorologicheskim stantsiiam i postam, Vypusk 11, Agrometeorologicheskie nabliudeniia na stantsiiakh i postakh, Chast' 1, Osnovnye agrometeorologicheskie nabliudeniia.** [Instructions for hydrometeorological stations and posts, Vol. 11, Agrometeorological observations at stations and posts, Pt. 1, Basic agrometeorological observations.] Leningrad, Gidrometeoizdat, **1957.** 204 p. 48 figs., 32 tables. **DLC** (QC857.R9A47)—Instructions and regulations for agrometeorological stations and hydrometeorological stations and posts which are involved in agrometeorological observations, with the exception of service for pastures and grazing and used by migratory herdsmen, are included in this durable manual (9850 copies). The first part deals with organization of agrometeorological stations and service; Pt. 2 with observations of soil temperature, humidity, frost, frozen soil, phenology of crops, condition of crops and livestock and, finally, with compilation of agrometeorological observations at stations. Many illustrations, examples and forms are included. *Subject Headings:* **1. Observers manuals 2. Instructions for agrometeorological stations 3. Agrometeorological observations 4. Phenological observations.**—*M.R.*

10.7–52 551.5:629.13(02)

U. S. Air Force, **Weather for aircrew trainees.** Its *A F Manual*, 105-5, pub. Washington, D. C., **1956.** 157 p. figs. **DLC** (UG633.A3763)—A profusely illustrated manual for aircrew members to enable them to understand and to use the available weather services. Physical properties of the atmosphere, air masses, fronts, visibility restrictions, turbulence, icing, thunderstorms, tropical, Arctic and stratospheric weather, supporting weather facilities and services, weather maps, flight plans, progress charts are presented. Schematic charts and maps take up over half of the manual. *Subject Headings:* **1. Aeronautical meteorology manuals 2. Air Weather Service manuals.**—*M.R.*

POPULAR METEOROLOGY BOOKS

10.7–53 551.46:92 551.46:91.04

Shuleĭkin, Vasiliĭ Vladimirovich, **Dni prozhitye.** [Bygone days.] Moscow, Akademiia Nauk SSSR, **1956.** 397 p. figs., photos. At head of title: *Akademiia Nauk SSSR, Nauchno-Populiarnaia Seriia.* **DLC** (GC30.S5A3)—A fascinating autobiography of SHULEĬKIN—one of the outstanding geophysical scientists of our day, who lived through the Revolution, the reconstruction of the oceanographic research work in the laboratory and at sea, the devastation of the Main Geophysical Observation (especially Kalitin's Actinometric Laboratory and the Aerological Observatory where MOLCHANOV developed the first radiosonde), the reconstruction of the observatories after the war, during which period SHULEĬKIN became director of the Hydrometeorological Service and, lastly, his work on pure oceanography. Separate chapters

take up his childhood days, education, research on the sea, expeditions on the seas, and life as a naval officer and academician. Photographs of many of the outstanding Ru scientists in this field are included. Details of some of the author's work on relation of oc temperatures and currents to continental climate and weather; on models for predicting heights, motions and decay, etc.; on recent, as well as earlier, research vessels (up to 1956); on the color of the sea, submarine optics, acoustics and seismics, etc. Interest in m (as a composer, etc.) and poetry is evident throughout the autobiography. Scores of pic of people, places, ships and equipment are included. If this book is not translated into En it will be a great loss to those who cannot enjoy it. *Subject Headings:* **1. Biography of V Shuleĭkin 2. Oceanographic expeditions 3. Popular oceanography.**—*M.R.*

10.7–54 551

†Löbsack, Theo, **Der Atem der Erde: Wunder und Rätsel der Luft.** [The breath of earth: wonder and mystery of air.] Munich, Biederstein, **1957.** 303 p. figs. and pho bibliog. p. 297–303. **DLC** (QC881.L6). Transl. by E. L. and D. Rewald into English is London, Collins, **1959**, with title **Earth's envelope.** 256 p. American edition issued N. Pantheon, 1959, with title **Our atmosphere.** Review of American ed. by H. E. Landsber *Science*, 130(3370):262, July 31, **1959.** Transl. by Nathalie Gara into French issued P Librairie Hachette, **1958**, with title **Cet air qui nous entoure: l'atmosphère.**—A beautif illustrated popular science book glamorizing the atmosphere as the source and sustenanc life on earth, with chapters on the history of the atmosphere, its structure, clouds and opt phenomena, auroras, photosynthesis and aerobiology; atmospheric acoustics, planet atmosphere; future fate of earth's atmosphere; the "restless atmosphere"; weather and f casting; artificial weather, condensation trails, cloud seeding, atom bombs and weather, wi and special winds, tornadoes, hurricanes, jet stream, thunder and lightning, chemistry atmosphere; man and the air: breathing, air conditioning and air pollution, aviation astronautics, weather and disease, climatic changes and radioactive dust in air. *Sub Heading:* **1. Earth's atmosphere.**—*M.R.*

10.7–55 551.57(

Zamorskiĭ, Aleksandr Dmitrievich, **Opredelitel' atmosfernykh iavleniĭ.** [Identificat of atmospheric phenomena.] Moscow, Gosud. Uchebno-Pedagogicheskoe Izdatvo Mi sterstva Prosveshcheniia RSFSR, **1958.** 79 p. 15 figs. **DWB** (M(03) Z25op)—A popu pamphlet (15,000 copies), discussing and illustrating the common and many unusual mospheric phenomena: hydrometeors, lithometeors, electrometeors, etc. Dew, fog dr frost, glaze, drizzle, showers, rain and snow, snow, graupel, hail, freezing rain. fog of vari types, smog, ice fog, dust, haze, blizzards, winds, gales, hurricanes, squalls, gusty winds, du devils, waterspouts, tornadoes, hot dry winds (sukhovei), optical phenomena, rainbows, hal coronas, mirage, electrical phenomena; thunderstorms, lightning, St. Elmo's fire, aurora etc., are defined and discussed. A brief glossary of meteorological terms and an alphabeti list of terms is appended. *Subject Headings:* **1. Atmospheric phenomena 2. Hydrometeo 3. Glossaries.**—*M.R.*

10.7–56 551.

†Rouch, Jules Alfred Pierre, **Les océans.** [The oceans.] Paris, Librairie A. Colin, **195** 216 p. 11 figs., 44 refs. (*Collection Armand Colin*, No. 320.) **DLC** (GC15.R6)—A sm popular technical book on oceanography. Observational techniques, physical properties the oceans, and application to navigation, meteorology, naval science, fishing and industry a given. Depths, currents, salinity, color, transparency, waves, tides, ice, etc. are discusse both with respect to measurement and results of recent measurements. A bibliography French work on oceanography from 1725 to 1955 is included. *Subject Heading:* **1. Physic oceanography.**—*M.R.*

TRANSLATIONS

See: **Satellite observatories** (Shternfel'd), 10.7–19.

GENERAL GEOPHYSICS AND METEOROLOGY

ARCTIC RESEARCH

10.7–57 551.509.312(98)

Reed, Richard J. (*Univ. of Wash., Seattle*), **Arctic weather analysis.** (In: Polar Atosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 1, Meteorology Section.** N. Y., ergamon Press, **1958.** p. 124–136. 5 figs., 2 tables, 9 refs.) Also issued in *Journal of tmospheric and Terrestrial Physics*, London, Special Supplement, Pt. 1, **1957.** p. 124–136. **WB, DLC**—A new approach to analysis is advocated. It departs from the Norwegian stem and may be said to have been introduced in the early 1940's when Rossby applied rticity concepts to the problem of long barotropic waves, followed by Sutcliffe's contribuons on the dynamics of baroclinic waves and then the development of numerical forecasting y Charney and others. Thus, the shift in emphasis is toward the representation of conuous fields of the principal atmospheric variables—temperature and pressure (or contoureight). Summarized results of 53 cross-sections (same samples shown) along a line from lert to Kodiak during Feb.–June 1955 are given and it is concluded that the baroclinic ructure is complex and not well represented by conventional frontal models, either in the rctic or middle-latitude weather systems. The applicability of Fjørtoft's method is demonrated in summarized results of 18 barotropic forecasts. Highest correlation between 24-hr. bserved and predicted 500 mb changes is 0.82, lowest 0.20. *Subject Headings:* **1. Fjørtoft's raphical method 2. Weather analysis 3. Arctic.**—*W.N.*

10.7–58 551.506.7:551.506.5(98)

*Gaĭgerov, S. S., **Aerologicheskie nabliudeniia na dreĭfuiushcheĭ stantsii "Severnyĭ olius-4" v 1955/56 g.** [Aerological observations on the drifting station "North Pole-4" in 955–56.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 18, **1957.** 8 p. 20 figs. (some fold.), 5 tables, 13 refs. **DWB**—Organization of the meteorological work n the SP-4 expedition (along 180th meridian from 81°N to 87°39′N) in upper air wind (radio eodolite) and radiosonde observation, from April 12, 1955–April 17, 1956 (798 radio soundings veraging 20 km height (2700 to 35,540 m extreme height), gas generation, supplemental bservations, etc. are discussed in Pt. I of this monograph. In Pt. II the results of he observation are summarized by means of cross-sections to 13 km, tropopause height and emperature (4.26 to 12.08 km. and −33.0 to −73.0°C), surface inversion data and time cross ection surface inversion, etc. Operations and equipment are illustrated. *Subject Headings:* **. Upper air observations 2. Soviet drifting expedition, SP-4 3. Arctic tropopause data . Arctic surface inversions 5. Arctic.**—*M.R.*

10.7–59 551.513.3:551.515.7(98)

Keegan, Thomas J., **The wintertime circulation in the Arctic troposphere.** (In: McGill niv. Arctic Meteorology Research Group, **Contributions to the study of the Arctic circulation.** cientific Report No. 7 on its Contract AF 19(604)-1141, March **1958.** p. 22–47. 10 figs., tables, 5 refs.) **DWB**—The author surveys the distribution, development and motion of he synoptic features in the high latitudes appearing on synoptic weather charts. The data or this study is based on observations at Ice Island T-3 for the three winters beginning with 952, Daily Series Synoptic Weather Maps of U. S. Weather Bureau and daily weather reports f the Deutscher Wetterdienst. Each cyclone and anticyclone which went north of 60° was ccated to the nearest 5° of lat. and long. The central pressure of the sea-level system, the eight of the 500 mb surface above sea level, and the 24-hr movement of the cyclone or antiyclone were recorded. The frequency of cyclones (215) and anticyclones (115) per 100,000 q mi was computed; the area north of 60° was divided into six sectors and the distribution f direction and speed of wind direction in each sector were determined. The variability of the tandard deviation was measured by the vector standard deviation and constancy for each ector. Cyclones most frequently enter the Arctic by way of the Atlantic Ocean; most of hem stagnate at the head of Baffin Bay or fill in the vicinity of Spitsbergen and Novaya emlya. The centers of very few cyclones actually enter Alaska and northern Canada; ajor activity comes from weak, cold lows. Anticyclones mainly occupy positions from astern Siberia eastward to Greenland. The strongest and most persistent are associated

with warm air aloft coming from Atlantic and Pacific ridges. Over the pole itself the ci
tion is as complicated as at mid-latitudes. Tables giving means, extremes, and varia
of cyclonic and anticyclonic data and numerous synoptic charts are presented. S
Headings: **1. Arctic anticyclone circulation 2. Synoptic analysis 3. Arctic air circul
4. Arctic.**—*I.L.D.*

10.7–60 551.583.2:551.311.12

Kaplin, P. A., **Otstuplenie lednikov Novoĭ Zemli.** [The retreat of Novaya Ze
glaciers.] *Priroda*, Moscow, 47(3):88–90, March **1958.** 3 figs. Transl. into Englis
E. R. HOPE issued as *Canada. Defence Research Board, Translation* 293 R, May **1958.** A
able. **DWB, DLC**—The extensive retreat of the glaciers on the northwest coast of No
Zemlya is discussed. The retreat of the glaciers since 1933 has revealed a whole seri
fjords on the northwest coast line. Between 1933 and 1952 the front of the glacier in
strantsev Bay has retreated to the foot of Mount Iskaniĭ and is 13 km from the Cape entra
in 19 yrs the glacier front has retreated 8 km. The mean speed of contraction of the gl
tongue was 420 m per year. Brown Glacier has retreated 5 km in 19 yrs. The shrin
proceeds by calving at the ice front. The bottom surface of the glaciers lies below the pre
day sea level. It is suggested that under the ice sheet there is a strait dividing the island a
the line Choev Bay-Blagopoluchie Inlet. This decline of glaciation is explained by a ge
warming of the Arctic caused by an intensification of the Arctic circulation and by an "act
tion" of the Gulf Stream, more specifically a rise in the temperature of the coastal wate
Novaya Zemlya and their salinity. Even with the general shrinking some individual gla
have remained unchanged during the period 1933–1952. *Subject Headings:* **1. Glacier ret
2. Warming of the Arctic 3. Novaya Zemlya, Soviet Arctic.**—*I.L.D.*

ANTARCTIC RESEARCH

See also: **CSAGI 4th Antarctic Conf., Paris 1957,** 10.7–65.

10.7–61 551.506.22

Siple, Paul A., (*Scientific leader, Amundsen-Scott IGY South Pole Station*), **Man's
winter at the South Pole.** *National Geographic Magazine*, Wash., D. C., 113(4):439–
April **1958.** figs., photos (some in color). **DLC, DWB**—Vivid color pictures show the
stallations and activities of the station at the South Pole under the direction of PAUL A. SI
during the 1957 season. Many of the meteorological aspects are brought out in the pictu
and text. A photo of a thermometer reading −98°F on Sept. 17, 1957 is included.
author tells of experiences while walking half a mile to the exact South Pole (and back)
the coldest time of the year (temperature −102°F) just before the sun came back in late Se
1957. Meteorologists made up the largest group of scientists in the Antarctic—four w
stationed at the South Pole for 24-hr service. Automatic equipment was inspected ever
hours and readings made of outdoor instruments. The aerological, auroral, ionosphe
glaciological and seismic work is mentioned briefly. Individual members of the party an
cross section model of the elaborate facilities at the station are shown in illustrations. WH
relief came in Dec., 1957 the men brought colds and infections which hit all the members w
had wintered over. *Subject Headings:* **1. South Pole (Amundsen-Scott) station 2. IG
Antarctic program 3. South Pole.**—*M.R.*

10.7–62 551.508.822:551.50

Gilbert, J., **Premiers résultats des sondages aérologiques effectués en Terre Adé
pour l'Année Géophysique Internationale.** [First results of aerological soundings at Adé
Land for the International Geophysical Year.] *Académie des Sciences, Paris, Comptes Rend*
247(1):118–121, July 7, **1958.** 5 refs. **DLC**—Comparison between upper air winds in 19
at the base of Dumont d'Urville and in 1950–51 at the base of Maudheim and Port-Mart
shows practically the same speeds, with a smaller dispersion at Adélie Land. A great stabili
is observed near 1200 m. at Dumont d'Urville throughout the year. *Subject Headin*
**1. Aerological soundings 2. International Geophysical Year, 1957–1958 3. Dumont d'Urvil
Adélie Land.**—*A.V.*

10.7–63 551.524.36(99)

Shliakhov, V. I., **O minimal'nykh temperaturakh v Antarktide.** [Minimum temperatures the Antarctic.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:5–7, April, **1958.** table, refs., 3 eqs. **DWB, DLC**—The reduction in atmospheric counterradiation is one of the principal causes of the extremely low atmospheric temperature in the Antarctic. The counterradiation of the atmosphere E^1 may be computed by the equation $B = E^1 - S\sigma T^4$ where B = balance of long wave radiation. For $B = 0$ the final temperature of the system "snow surface-atmosphere" is determined by $T_0 = \sqrt[4]{E^1/S\sigma}$. The rate of radiational cooling, on the assumption that the principal masses of water vapor is concentrated in the lower three kilometer layer of the atmosphere, can be determined by the equation $dT/dt = 245\Delta B/P_1 - P_2$ (T = temperature, t = time, B = difference of values of radiational balance determined by the Shekter nomogram, P_1 and P_2 = pressure at surface level and at 3 km). Since the rate of change of counter-radiation for the Antarctic is 0.005°C per hour, it can be neglected in computing minimum temperature. Computation of minimum temperature made with the above equation and with the Shekhter nomogram indicate the minimum possible temperature in the lower three kilometers of the atmosphere in the Antarctic is -80 ± 2°C; and at higher elevations the temperature falls at a rate of 0.5°C/100 m. A table with minimum temperatures calculated for stations Vostok-1 and Iuzhnyi Polius in May and July, 1957 is presented. *Subject Headings:* **1. Minimum temperatures 2. Antarctica.**—*I.L.D.*

IGY

See also: **Aerological soundings, Adélie Land** (Gilbert), 10.7–62.

10.7–64 551.506.22:551.507.362.1

IGY, 1957/1958. U. S. National Committee. Technical Panel for Rocketry, **IGY rocket program.** Article prepared on behalf of the Subcommittee for IGY by N. W. Spencer. *Scientific Monthly*, Wash., D. C., 85(3):130–142, Sept. **1957.** photos. **DLC**—July 1957 through 1958 marks the beginning of man's concentrated effort to learn more about the space beyond our atmosphere by means of an international rocket program. About 200 rockets carrying a variety of instruments will be launched as a part of the U. S. program for the IGY. Various strategic points for this program as well as the instrumentation and the names of the participating research organizations are mentioned. The following topics are discussed: data transmission and recording; temperature, pressure, associated parameters; concentration of ozone; airglow; magnetic field; solar radiation; ionospheric measurements; cosmic ray experiments and analysis and publication of data. *Subject Headings:* **1. IGY rocket program. Spencer, N. W.**—*N.N.*

10.7–65 551.506.22:061.31(99)

International Geophysical Year, 1957/1958. CSAGI 4th Antarctic Conference, Paris, June 13–15, 1957, **National reports presented at the 4th CSAGI Antarctic Conference.** *I.U.G.G., Chronique de l'U.G.G.I.*, No. 5:167–208, July **1957.** Reports from Argentina, Australia, Belgium, Chile, France, Japan, Union of South Africa, United Kingdom, United States of America, U.S.S.R. **DWB.** Also: **Report by the Adjoint Secretary of CSAGI for the Antarctic, G. Laclavère.** *Ibid.*, No. 6:211–239, Aug. **1957. DWB**—Transactions of the 4th Antarctic Conference contain examples of Antarctic synoptic charts made at the Little America Weather Control (surface, 700, 500 and 300 mb charts) on May 4th and 9th, 1957. Reports of working groups on Antarctic weather control, on New Zealand Antarctic Symposium scheduled for March 1958, and national reports are included in these two publications. *Subject Headings:* **1. Antarctic conferences 2. CSAGI 4th Antarctic conference, Paris, 1957. I. Laclavère, G.**—*M.R.*

WMO

10.7–66 378.3:551.5:061.31

Sutton, O. G., **Award of the International Meteorological Organization Prize to Mr. Ernest Gold.** *Meteorological Magazine*, London, 87(1034):252–253, Aug. **1958. DWB, DLC.**

Also: **Presentation of the third IMO Prize to Mr. Ernest Gold.** *World Meteorologic* ... *ganization, WMO Bulletin*, 7(4):178–179, Oct. **1958.** photo. **DWB.** Also: **Interna** ... **Meteorological Organization prize.** *Weather*, 13(11):375, Nov. 1958. **DWB**—The ... award of the International Meteorological Organization prize was awarded to ERNEST ... formerly Deputy Director of the Meteorological Office of Great Britain, President of the ... Meteorological Society 1934–1936, Symons Gold Medalist in 1926 and President of the ... mission for Synoptic Weather Information of the I.M.O. from 1919 until his retirement ... the Meteorological Office in 1947. Presentation of the award was made by ANDRÉ V... President of W.M.O. PRES. VIAUT emphasized the recipient's pioneering work in ... national synoptic meteorology. *Subject Headings:* **1. Awards to meteorologists 2. V... awards 3. World Meteorological Organization 4. Gold, E.**—*M.L.R.*

SYMPOSIA AND CONFERENCES

See also: **CSAGI 4th Antarctic Conf., Paris 1957, 10.7–65.**

10.7–67 551.5...

Undt, W., **Dritte medizin-meteorologische Arbeitstagung in Hamburg vom 13. bi... Juni 1957.** [3rd medical meteorology working meeting at Hamburg, June 13–15, 1... *Wetter und Leben*, Vienna, 9(3/5):78–81, **1957. DLC**—The author lists the research sta... on medical meteorology in the vicinity of Hamburg, the principle themes discussed at va... conferences on medical meteorology held under the auspices of the Hamburg group, and ... specific problems of medical meteorology. This is followed by a brief summary of som... the topics discussed at the June 1957 conference on medical meteorology. These include... following: medical meteorological problems of resorts, the climatic classification of ... Germany on the basis of medical meteorology viewpoints, therapeutic effect of North... climate, etc.; weather and human well-being, including the effect of weather on cardiac inf... and stenocardiac symptoms; meteorotropic illnesses in children; föhn and föhn effects ... mospheric radiation and human health, and problems of radioactivity. *Subject Head...* **1. Medical meteorology symposia 2. Hamburg.**—*I.L.D.*

10.7–68 551.586...

Undt, W., **6. Konferenz der Gesellschaft für biologische Rhythmusforschung vom 26.... 28. August 1957—Semmering.** [6th Conference of the Society for Biological Rhythm ... search, Semmering, Aug. 26–28, 1957.] *Wetter und Leben*, Vienna, 9(6/9):122–123, 1... **DLC**—The purpose of this conference was to promote the scientific study of biological rhy... and of chronological changes. A knowledge of biological rhythm is relevant to bioclimatol... where an ignorance of biological rhythm may lead to erroneous conclusions on atmosph... influence. The topics included the problem of time in biology and the law of excitat... endogenous plant rhythms, rhythm of body temperature and amount and constituents ... urine, rhythmical changes of equilibrium regulation in man, influence of temperature and ... treatment upon the daily periodicity of lizards, interdiurnal changes of body temperature as ... attempt to characterize thermoregulatory processes, etc. *Subject Headings:* **1. Bioclimatol... conferences 2. Biological rhythm.**—*I.L.D.*

SOCIETIES, INSTITUTIONS AND OBSERVATORIES

See also: **Center for Physics of the Globe, Dourbes, Belgium** (Lahaye), 10.7–44.

10.7–69 551.5:061(...

Meteorological Society of Japan, Tokyo, **Short history of the Meteorological Society ... Japan in commemoration of the 75th anniversary.** Tokyo, **1957.** 68 p. In Japane... Cover-title in Japanese and English. photos—The general history of the meteorologi... society of Japan, its progress in pure and applied meteorology, relations with domestic societ... and foreign meteorological circles, annotated chronological table (1868–1957) of the soci... and other related papers are presented. The meteorological society of Japan was founded

[ay, 1882 with 7 meteorological observatories and its publication, *Kisho-shushi* (*Journal of the Meteorological Society of Japan*). Central, marine and high altitude meteorological observaries were established in 1920. Membership list of the society at the beginning and the ociety charters are appendixed. *Subject Headings:* **1. History of Meteorological organizations Meteorological Society of Japan.**—*J. Woo.*

10.7–70 551.5:061.2

Bulavko, A. G., **Uchrezhdenie Meteorologicheskogo obshchestva v Germanskoĭ Demoaticheskoĭ Respublike.** [Establishment of the Meteorological Society of the German emocratic Republic.] *Meteorologiia i Gidrologiia*, Leningrad, No. 10:57, Oct. **1957. DWB, LC**—By decision of the Academy of Sciences of the German Democratic Republic a meteorogical society was established with its seat in Berlin. Its purpose is to organize scientific eetings and conferences, publish a meteorological journal and to maintain close relations ith other scientific societies and corresponding organizations in the German Democratic epublic. A general German meteorological meeting with foreign participation is planned for ct. 1957. On the founding day March 1, 1957, the following offices were elected: Chairman, HILIPS and Secretary, ORTMEYER *Subject Headings:* **1. Meteorological societies 2. East ermany.**—*I.L.D.*

10.7–71 551.5:061.6

Korff, S. A. (*N. Y. Univ. College of Eng.*), **Physics in the Hawaiian Islands.** *Physics oday*, 9(2):14–15, February **1956.** 2 photos. **DWB**—The University of Hawaii in its arious engineering departments has demonstrated its interrelation with the public. Research both meteorology and hydrology is supported by the pineapple and sugar planters. Facilis in geophysics, physics of solar phenomena and research are well provided for. A picture the antenna system on the summit of Mt. Haleakala (10,025 ft), Island of Uaui, is shown. awaiian trade wind clouds are at about 6000 ft. This station is promising and forms an nportant addition to the international chain of stations for geophysical research. *Subject eadings:* **1. Research institutes 2. University of Hawaii 3. Hawaiian Islands.**—*N.N.*

10.7–72 551.5:061

But, I. V. and Mirochnik, S. F., **Prazdnovanie 25-letnego iubileia Odesskogo gidroeteorologicheskogo instituta.** [Celebration of the 25th anniversary of the Odessa Hydroeteorological Institute.] *Meteorologiia i Gidrologiia*, Leningrad, 9:58, **1957. DWB, DLC**—he 25th anniversary of the Odessa Hydrometeorological Institute was celebrated May 14, 957. In honor of the anniversary, a student conference and a scientific conference of the aculty of the institute were held. Participants of the conference were students and faculty om the Leningrad, Moscow, Odessa, KISHINEV hydrometeorological institutes. *Subject eadings:* **1. Meteorological institutes 2. Odessa, U.S.S.R.**—*I.L.D.*

10.7–73 52:06(6801)

Dommanget, J.; **Le projet de création d'un observatoire européen en Union Sud-Africaine.** The project of founding a European Observatory in the Union of South Africa.] *Ciel et erre*, Brussels, 74(7/8):305–357, July/Aug. **1958.** 32 figs., 14 refs. **DLC**—The author rticipated in the mission which chose a site for the setting up of a European observatory the Union of South Africa. This mission was undertaken for the European Southern bservatory (E.S.O.). In this article he reports on the object of this expedition, the means had at its disposal, the sites studied and the results obtained. The author points out the imrtant part played by meteorological conditions, refraction and the atmospheric turbulence the performance of an astronomical instrument. For the investigation of atmospheric rbulence, the E.S.O. mission utilized the diffraction circle method, which is explained. he observation of flickering shadows was undertaken and the photoelectric measurements of mospheric transparency are described. Finally, the author gives an account of the survey the southern regions of the South African Union and the provisional results obtained in the reat Karroo and Little Karroo region. The region which should be the most suitable for e setting up of a great observatory in the Cape province should be situated north of Prince

Albert, at a distance from the Swartbergen at least equal to that which separates Zeeka... from it. *Subject Headings:* **1. Observatory sites 2. European Southern Observatory m... 3. South Africa.**—*A. V.*

SERVICES AND NETWORKS

See also: **Agromet. stations, Odessa Region, U.S.S.R.** (Semenets), 10.7–109.

10.7–74 551.5(06...

Japan. Meteorological Agency, **Japan Meteorological Agency. 1957.** 13 p... photos. on 10 p., chart, fold. map. **DWB** (M(06) J35ou)—The history of the Japan... teorological Agency, its organization, networks, functions of the various divisions, ser... to the public and to industry, transportation, etc. are described, and illustrated by photogr... of the 5 former directors and the present director (KIYOO WADATI), and of the building... grounds as of 1875, 1882 and 1957, respectively; radar equipment, the Osaka District Met... logical Observatory, the Nagano, Torishima and Marcus Island weather stations, ocean we... ship, Mt. Fuji instrument tower (3776 m), an automatic radio telemetering installation,... other specialized equipment are described, and the network is shown on a chart. The... weather station was established at Hakodate, Hokkaido in 1872 and the Tokyo observ... June 1, 1875. Daily weather maps have been published since March 1883. Japan wa... mitted to the IMO in 1885. The Tokyo Meteorological Observatory became the Ce... Meteorological Observatory in Jan. 1887. On Oct. 11, 1939, control of all weather servic... Japan were transferred to the National Center. On Sept. 10, 1953 Japan was admitte... WMO. On July 1, 1955 the CMO became the Japan Meteorological Agency. Not only m... orological but seismological, volcanic, oceanographic, and geomagnetic observations, war... and research are conducted by the Agency. In the network are 85 synoptic 6-hourly, ... hourly and 30 hourly observation stations. For climatology there are 12 key stations (4-ho... observations), 143 general (6-hourly) and 1325 local (temperature and precipitation once d... observations), plus 420 rain gage stations, 142 automatic rainfall stations, 67 solar radia... (solar and sky), 12 normal incidence solar radiation, 12 RAOB and RAWIN, 7 PIBAL,... seismograph, 10 volcanic, 4 marine observatories, 42 selected ships, etc. *Subject Head...* **1. History of Japanese weather service 2. Meteorological networks 3. Japan. Mete... logical Agency 4. Japan.**—*M. R.*

10.7–75 551.501.9:551.547.2...

U. S. Air Weather Service, **List of stations reporting pressures to datum other than m... sea level, synoptic code.** Its *AWS Technical Report* 105-65, June 1, **1958.** 101 p. 2 fi... 2 tables. **DWB** (M(055) U58a). Note: This Technical Report supersedes *AWSTR* 105... Nov. 1, **1953** and *AWSTR* 105-65 A, May 1, **1954.**—Basic data for this report is taken fr... *WMO Publication* 9, TP4, including supplements up to No. 15, Vol. A, 15 Aug. 1957. Tab... give index number, name of station, latitude, longitude, elevation and level to which pressu... are reduced (e.g., station level, 850, 700 mb; 1000, 2000 and 3000 gdm). Stations are gi... by index numbers within each country and countries within continental regions. Instructio... nomograms and tables for reduction to standard sea level base for use in synoptic analysis... a hemispheric or regional basis are appended. *Subject Headings:* **1. Pressure reduction to ... level 2. Stations reducing pressure to upper levels.**—*M. R.*

EDUCATION, HISTORY AND BIOGRAPHY

HISTORY

See also: **Hist. of Japanese weather service,** 10.7–74; **Blue Hill Obs. Library** (Brooks, Richardson), 10.7–76; **Historic weather records, U. S.** (Havens), 10.7–81.

10.7–76 551.5:026(0...

Brooks, Charles F. and Richardson, Shirley J., **Blue Hill Meteorological Observat... Library.** *Harvard Library Bulletin,* Cambridge, Mass., 12(2):271–281, **1958. DLC–**

story of the Blue Hill Meteorological Observatory Library, founded in 1885 by ABBOTT AWRENCE ROTCH (1861–1912) is recounted, with numerous quotations from annals of the arvard College Observatory and other sources. In 1913 ALEXANDER G. MCADIE stated at the library was probably the best collection of books and pamphlets outside of Washgton, D. C., and the number amounted to about 23,000 (in 1904 it was about 8000). Since 20 (to 1954) the accessions of the American Meteorological Society were added to the collecn. The paper includes a discussion of the files, classification system (UDC) and special bliographic services, librarians and a tribute by SHIRLEY RICHARDSON to the late CHARLES F. OOKS. *Subject Headings:* **1. Blue Hill Observatory Library 2. History of meteorological raries.**—*M.R.*

NEW SERIALS

10.7–77 550.3(05)

Geophysical Journal, Vol. 1, No. 1, March **1958.** Latest issue seen, Vol. 1, No. 3, Sept. **58.** *Quarterly.* Issued by Royal Astronomical Society, London. Price, Annual: (in U. S.) .00: Supersedes *Royal Astronomical Society, Monthly Notices, Geophysical Supplement,* ich ended with Vol. 7, No. 6, Nov. **1957.** For listing of contents of Vol. 1, No. 1 and 2, Pt. III, p. 1460, Nov. 1958; for No. 3, *see* Pt. III, p. 801, May 1959, *MAB.* Pertinent icles abstracted separately. **DWB.** *Subject Headings:* **1. Serial publications 2. Geoysical serials.**

BIOGRAPHY

See: **Biog. of V. V. Shuleĭkin,** 10.7–53; **Awards to meteorologists, WMO** (Sutton), 10.7–66.

BIBLIOGRAPHY

10.7–78 551.578.4:016 551.525.5:016

Sherrod, John, Jr. (*Library of Congress, Wash., D. C.*), **The SIPRE bibliography.** *Eastern ow Conference, 1956 and 1957, Proceedings,* Vol. 4:121–122, pub. **1957. DWB** (M06 E14p) The SIPRE Bibliography project is concerned mainly with publishing abstracts of papers snow, ice and permafrost. It is expected that practically all the world's literature on se subjects (amounging to a total of 20,000 items) will have been included in another o years. Figures on the distribution of this material by language and by date of publication e given. Special services offered by the Project are mentioned. *Subject Headings:* **1. SIPRE bliography 2. Snow, ice and permafrost bibliographies.**—*G.T.*

10.7–79 551.5:016(673)

†Keil, Karl (*Deutscher Wetterdienst, Bad Kissingen*), **Ein bibliographischer Beitrag über Anfänge meteorologischer Studien in Angola vor 1930.** [Bibliographical contribution the early meteorological studies in Angola before 1930.] (In: Angola. Serviço Meteorico, **Miscelanea geofisica.** Luanda, **1956.** p. 1–10. 82 refs.) **DWB** (M(08) A592mi)—bibliography of data sources and international literature dealing with meteorological obvations in Angola, based upon material available at the German Weather Service library in d Kissingen. *Subject Headings:* **1. Bibliography of Angolian meteorological literature Meteorological bibliographies 3. Angola, West Africa.**—*G.T.*

10.7–80 551.5:002

Dutta, S. and Rajagopalan, T. S., (*both, Indian National Scientific Documentation Centre, w Delhi*), **Literature citations in scientific and technical periodicals: a survey.** *Journal Scientific and Industrial Research, Sec. A*, 17(7):259–261, July **1958. DLC**—An investigator ften confronted with a variety of problems in his literature search because of the diverse ys literature citations are made in scientific and technical periodicals. This is mainly due divergent instructions issued to authors by editorial boards of periodicals specifying the nner in which literature citations are to be made. The problems created by the lack of a ndard practice in this regard have been receiving the attention of editors, bibliographers, cumentationists and others. A survey of a representative selection of 200 Indian and

foreign scientific and technical periodicals was recently undertaken with a view to ob information on the patterns of literature citations. The results presented in the fol paragraphs reveal the diversity in existing practices and emphasize the need for standard of a vital aid for literature search. *Subject Heading:* **1. Literature citations.**—*Authors' a*

10.7–81 551.506(73):9

†Havens, James M., **An annotated bibliography of meteorological observations United States, 1715–1818.** *U. S. Weather Bureau, Key to Meteorological Records Docume* No. 5.11, **1958.** 14 p. 2 figs., table, 24 refs. **DWB**—Over eighty systematic, instrum records have been located in American and British libraries and museums. They are des as to completeness and nature of contents. The place of deposition of the manuscrip references to major published accounts are given where known. (*See also* 7.11–59, Nov. *MAB.*) *Subject Headings:* **1. Historic weather records 2. Bibliography of historical re 3. United States.**—*Author's abstract.*

10.7–82 551.555.

†**Bibliografiia po sukhoveiam i zasukham i meram bor'by s nimi, 1917–1955.** [Bibliog on dry winds and droughts and control measures, 1917–1955.] (In: Akademiia Nauk S Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** Moscow, **1957.** p. 367). **DLC** (QC940.R9A6)—This alphabetically arranged list of references to Ru literature on drought, dry winds, shelter belts and methods for conservation of soil and mo in the semi-arid regions of the U.S.S.R. contains over 400 titles, most of which are me logically important. *Subject Headings:* **1. Sukhovei 2. Drought bibliographies 3. S belt bibliographies 4. Forest influences.**—*M.R.*

GLOSSARIES—TERMINOLOGY

See also: **Hydrometeors** (Zamorskiĭ), 10.7–55.

10.7–83 551.4

Nemetsko-russkiĭ okeanograficheskiĭ slovar. [German-Russian oceanographical sary.] Ed. by N. N. Gorskiĭ; V. I. Gorskaia and V. K. Shalagina. Moscow, Gosud. I Tekhniko-Teoreticheskoĭ Literatury, **1957.** 239 p. 7 refs. **DLC** (GC9.N4) (4000 copi Contains 6500 German terms relating to marine hydrology, glaciology, biology, geo meteorology, fishing industry and engineering, with equivalents in the Russian language Cyrillic alphabet. The listing of Russian terms in alphabetical order does not contain e alents but merely a reference to page and column on which the Russian term is fou conjunction with the German term. A rich variety of up-to-date terms are included, bu definitions. Terms used by DIETRICH and KALLE in **Allgemeine Meereskunde, 1957** 8.6–7, June 1957, *MAB*), are included. *Subject Headings:* **1. German-Russian oceanogra glossary 2. Oceanographic glossaries 3. Russian-German oceanographic glossary. I. skiĭ, N. N.** (*ed.*) **II. Gorskaia, V. I.** (*ed.*) **III. Shalagina, V. K.** (*ed.*).—*M.R.*

10.7–84 551.5:0

McDonald, James E. (*Inst. of Atmospheric Physics, Univ. of Arizona, Tucson*), **"Dep tion"—a proposed antonym for "sublimation."** *Journal of Meteorology*, Boston, 15(2): 247, April **1958.** 12 refs., footnotes. **DWB, DLC**—Present meteorological terminology not contain an antonymous pair of terms referring specifically to solid vapor-transiti For both the solid-to-vapor and the inverse vapor-to-solid, the single term "sublimation used. The author analyzes the use of phase change terms in physical chemistry and etymology of "sublimation," and concludes that it is impossible of finding a suitable anto for sublimation. Accordingly, he recommends the use of the word "deposition" to denote vapor-to-solid transition. Quotations from meteorological literature in which the w deposition has already been used are cited. It is suggested that sublimation be restricted to the solid-to-vapor stage. *Subject Headings:* **1. Meteorological terminology 2. Definiti 3. Deposition.**—*I.L.D.*

PRACTICAL AND APPLIED METEOROLOGY

OCEANOGRAPHY AND MARINE METEOROLOGY

See also: **Water waves and breakers** (Stoker), 10.7–11; **Oceanog. texts.** (Istoshin), 10.7–21; **"Vitiaz" cruises, 1951-55** (Muromtsev), 10.7–29; **Biog. of V. V. Shuleĭkin,** 10.7–53; **Physical oceanog.** (Rouch), 10.7–56; **German-Russian oceanog. glossaries,** 10.7–83.

10.7–85 551.556.8:551.515:525.63

Lauwerier, H. A., **The influence of a homogeneous wind upon an infinitely wide North ea.** *Amsterdam. Mathematisch Centrum. Afdeeling Toegepaste Wiskunde, Rapport,* No. 41, ov. **1957.** 31 p. 11 figs., 8 tables, eqs. **DWB** (M(055) A528ra)—As a first step in working it a solution to the problem of the elevation of the water at the coast of a rectangular North a, the author has developed a model with an infinitely wide shallow sea subject to a steady ind perpendicular to the coast, and neglecting vertical motions and other complications. ne general solution is followed by a treatment and discussion of free motions, of the elevation the coast, due to a step function windfield (30 m/sec gives 4 m elevation), due to periodic otions, or windfields, and due to a suddenly starting periodic wind (sinusoidal) (3.5 m/sec ind gives >2 m maximum elevation), a half-plane sine and a step function windfield of $\lambda = 0$. *ubject Headings:* **1. Wind effects on storm tides 2. North Sea.**—*M.R.*

10.7–86 551.461.2

Lisitzin, Eugénie (*Inst. Finlandais pour l'Exploration de la Mer, Helsinki*), **L'analogie des oyennes mensuelles du niveau de la Méditerranée.** [Analogy of the average monthly sea vels of the Mediterranean.] *Geofisica Pura e Applicata,* Milan, 40:120–126, **1958.** fig., tables, 7 refs., 2 eqs. French and English summaries p. 120. **DWB**—In the paper the uestion of the analogy between the average monthly sea-levels for a few tide gage stations the Italian and French coasts of the Mediterranean is studied. It could be established at the variation of the water amount in the sea is the principal factor in this regard, but that e distance between the stations, the influence of the Coriolis force and the effect of meteoro- gical elements must be considered too. *Subject Headings:* **1. Sea level variations 2. Ocean ater balance.**—*Author's summary.*

10.7–87 551.465

Fjeldstad, Jonas Ekman, **Ocean current as an initial problem.** *Geofysiske Publikasjoner,* slo, 20(7), June **1958.** 24 p. 9 figs., 2 refs., eqs. **DLC, DWB**—A stationary current in terogeneous water is accompanied by a definite density distribution in such a manner that e pressure gradient is balanced by the deflecting force of the earth's rotation. If the geo- rophical equilibrium is not present initially, the current will generate internal oscillations, hich will be propagated away from the area where the initial current is present. The waves ll be damped and at last the whole system will tend to a stationary state. In the present per we have chosen a special density distribution based on observations and we have con- dered a few different current systems. In the first case we consider a rectilinear current stem of finite width which decreases with depth and is zero at the bottom. The surfaces equal density are initially horizontal. The transition from the nonstationary to the station- y state has been studied and the results are given in diagrams. In the second case we have nsidered a non balanced vortex, the initial state and the resulting stationary vortex are ven in diagrams. At last we have considered a rectilinear current system in a sea which is unded on both sides. In this case there will be no stationary state, because the waves are flected from the sides of the canal. The oscillations will at first be similar to those found in e first case, but later the reflected waves will cause deviations. *Subject Heading:* **1. Ocean rrents.**—*Author's abstract.*

10.7–88 551.461.2

†Heinsheimer, G. J., **Zur Geophysik der eustatischen Schwankungen des Meeresspiegels.** Geophysics of eustatic oscillations of the sea surface.] *Archiv für Meteorologie, Geophysik d Bioklimatologie, Ser. A.,* Vienna, 10(2/3):242–256, **1958.** 3 tables, 32 refs., 3 eqs. In

German; English, German, French and Spanish summaries p. 242–243. **DWB, DLC** author reviews some of the current literature concerning the glacial, eustatic oscillat sea level, the various calculations on the relationship between the water produced from melting, and theories to account for the lack of correspondence between the amount of derived from melted glaciers and the height of the sea level. The hypothesis account this water deficit of ocean deepening is examined critically. After an examination of studies on the escape of the earth's atmosphere into space, the author advances the hyp that during the 10^6 years of the quaternary, hydrogen escaped from the earth's atmo into interstellar space. Extensive computations relating to these hypotheses are carri Tables giving data on the density and mean depth of sea water with a soil content o at different temperatures, escape of gases from the earth's atmosphere (L. SPITZER) an position of the atmosphere (G. E. HUTCHINSON) are presented. *Subject Heading:* **1. Se fluctuations.**—*I.L.D.*

10.7–89 5

*†Harvey, Hildebrande Wolfe, **The chemistry and fertility of sea waters.** Cam University Press, **1957.** 224 p. 65 figs., 28 tables, numerous eqs. Bibliography p. 20 **DLC** (GC116.H25 1957)—A technical book covering in Pt. I the composition of sea (organic and suspended); mixing and lateral transport; changes in composition due to animals and bacteria; factors affecting plant growth, etc. Pt. II takes up the chemis sea water: salinity, specific gravity, major and minor constituents, CO_2 cycle, dissolve N_2 and inert gases; and analytical techniques. An excellent bibliography to western lite is appended. Data is presented in tables and graphs. *Subject Headings:* **1. Chemistry water 2. Marine organisms 3. Chemical oceanography.**—*M.R.*

LIMNOLOGY AND HYDROLOGY

See: **Hydrologic forecast. texts.** (Popov), 10.7–12; **Temp., Lake Baikal** (Rossolimo), 10.7–

GLACIOLOGY AND ICE

See: **Glacier retreat, Novaya Zemlya, Soviet Arctic** (Kaplin), 10.7–60.

ASTRONAUTICS—SATELLITE OBSERVATORIES

See also: **Satellite obs. trans.** (Shternfel'd), 10.7–19; **IGY rocket program,** 10.7–64.

10.7–90 551.510.3:551.507.

Smithsonian Institution. Astrophysical Observatory, **Status reports on optical servations of satellites 1958 Alpha and 1958 Beta.** Its *IGY Project No.* 30.10, *Special R* No. 11, March 31, **1958.** 41 p. figs., tables, eqs. Report also issued under same tit International Geophysical Year, 1957/1958, IGY World Data Center A, Rockets and Sate as *IGY Satellite Report Series*, No. 2, March **1958.** 41 p. **DWB**—Contents: Hyne Allen and Whipple, Fred L.: **Preliminary results from optical tracking of the U. S. satellites,** p. 1–4. Henize, Karl G.: **The network of precision photographic satellite trac stations,** p. 5–6. Campbell, Leon, Jr.: **Moonwatch observations of satellites 1958 A 1958 Beta and 1958 Gamma,** p. 7–13. Whitney, Charles A.: **The orbit and variable acce tion of satellite 1958 Alpha,** p. 14–17. Sterne, Theodore E.: **The density of the uppe mosphere,** p. 18–22. Jacchia, Luigi G.: **Life expectancy of satellite 1958 Alpha,** p. 23. Ad R. M.: **Use and distribution of satellite predictions,** p. 24–25. Jacchia, Luigi G.: **Prog for determination of geographic sub-satellite points,** p. 26–27. Gaustad, John: **Pr tions for crossings of given latitude parallels—APO Ephemeris 5,** p. 28–29. Moore, Cha H. and Lautman, Don A.: **Predictions for photographic satellite tracking stations— Ephemeris 4,** p. 30–32. Briggs, R.: **Program of spot predictions for specific observing —APO Ephemeris 3,** p. 33. Fairman, Jean B. and Veis, George: **Charts of predicted s lite positions,** p. 34–39. **Harvard announcement cards,** p. 40–41. A series of paper

he optical satellite observations and scientific results of the racking of 1958 Alpha and Beta J. S.) satellites. Density at 368 km was calculated as 1.5×10^{-14} gm/cm^3 or 14 times that redicted by the A.R.C. model. Life expectancy is predicted as 3 to 5 years for 1958 Alpha. *ubject Headings:* **1. Satellite optical observations 2. Upper atmosphere density 3. U. S. tellite 1958 Alpha 4. U. S. satellite 1958 Beta.**—*M.R.*

10.7–91 551.507.362.2

Faust, H., **Importance of artificial satellites for meteorology.** *Universitas*, Stuttgart, (1):93–94, **1958. DWB**—Density, temperature, and composition of the rare atmosphere 200–300 mi are among the important information that can be gained better from a satellite owly spiraling toward the earth than from one entirely outside the earth's atmosphere. ncident and reflected radiation, UV and cosmic rays during solar eruptions, effect of ozone yer, and other data which will materially aid in short and even in long range weather forecast- g will be provided by a series of satellites whose economic benefits will far outweigh the st, high though this is. *Subject Heading:* **1. Satellite observatories.**—*M.R.*

10.7–92 551.507.362.2

Paetzold, H. K., **Die ersten künstlichen Erdsatelliten (Das Internationale Geophysika- sche Jahr, XIII).** [The first artificial earth satellites (The International Geophysical Year, t. 13).] *Die Umschau*, Frankfurt a.M., No. 1:3–7, **1958.** 7 figs. **DWB, DLC**—Details of he first two Soviet satellites, their trajectories, tracking and variations are discussed, along ith the first preliminary scientific results. It appears that atmospheric density at 200–250 km about double the value assumed in the past. Radio signals are being received from satellites r below the horizon which would indicate that radio waves are channeled along the ionosphere r some time before penetrating into the lower atmosphere. *Subject Headings:* **1. Satellite bservatories 2. Soviet satellite Alpha one 3. Soviet satellite Beta one.**—*G.T.*

10.7–93 551.507.362.2

Oort, J. H., **Bij het Internationale Congres voor Ruimtevaart te Amsterdam 1958.** [The nternational Congress for Interplanetary Flights.] *Hemel en Dampkring*, The Hague, (9):170–171; Sept. **1958. DWB, DLC**—With wave lengths shorter than 3000Å, radiation nnot reach the earth's surface, radiation between 500 and 3000Å is of special importance ecause absorption lines from the ground level of the atom are situated in this area. The bservation of these lines makes it possible to show the existence of some gases. The author ves a review of the possibilities of making such observations by means of artificial satellites rrying a telescope with a 40 cm aperture. *Subject Headings:* **1. Radiation measurement from tellites 2. Satellite observatories.**—*A.V.*

10.7–94 551.507.362.2

Raimond, J. J. Jr., **Vanguard I, de tweede Amerikaanse kunstmaan.** [Vanguard I, cond American artificial satellite.] *Hemel en Dampkring*, The Hague, 56(7/8):157–159, ıly/Aug. **1958.** 3 figs. **DWB, DLC**—A brief survey of the construction of Vanguard I. *ubject Headings:* **1. Satellite observatories 2. Vanguard I.**—*A.V.*

10.7–95 551.507.362.2

Jarry, Jules, **Retour sur le problème satellite.** [Reverting to the satellite problem.] *Age Nucléaire*, Paris, No. 8:42–45, Jan./Feb. **1958.** 3 tables. **DLC**—Attempt to supply me precise details about certain doubtful points which arose on the occasion of the launching artificial satellites. Before tackling the technical problems, the author deals with the atellites politics" of the U.S.S.R. and the U. S. He examines in detail the elements which ve a part in the determination of the total weight of the engine at its start; it may be ex- ssed as a function of certain parameters with different influences. He gives evidence the eat importance of the ratio of the "propellants" weight (fuel+combustible) to the net eight of the rocket stage, including thus the weight of the propulsive generator+the weight the containers+the weight of the feed-disposal+the weight of the accessories. This udy enables us to foresee certain bold solutions which will lead to satellites or engines which

are less heavy and cumbersome. *Subject Headings:* **1. Satellite observatories 2. Satellite weight.**—*A. V.*

10.7–96 551.510.42:551.590.25:551.507.362.2

†Hoenig, Stuart A. (*Armour Research Found., Illinois Inst. of Technology*), **Meteoric dust erosion problem and its effect on the earth satellite.** *Aeronautical Engineering Review*, N. Y., 16(7):37–40, July **1957.** 4 figs., table, 16 refs. **DLC**—Theoretical and laboratory studies of meteoric dust frequency and impact lead to the conclusion that the hazard for an earth satellite is not as great as feared—in fact, is almost negligible. Quantitative data are given in tables and graphs and discussed, and equipment for laboratory testing of impact velocities and erosion illustrated. *Subject Headings:* **1. Meteoric dust erosion of satellites 2. Meteoric impact detectors.**—*M. R.*

10.7–97 551.510.3:551.507.362.2

Paetzold, H. K. and Zschörner, H., **Die Dichte der äussersten Erdatmosphäre nach Satellitenbeobachtungen.** [The density of the exosphere according to satellite observations.] *Die Naturwissenschaften*, Berlin, 45(20):485–486, Oct. 15, **1958.** 2 figs., table, 7 refs., 2 eqs. **DLC**—The density of the atmosphere at 200 km has been more exactly observed after the launching of artificial satellites. After the launching of the Sputnik I and Sputnik II, the observed density at 225 km was quadruple the value observed by rockets. In a table, the authors give the characteristic data of the satellites and also the evolution of the air density is given after launching of Sputnik I and II. Temporary variations of temperature, density of the high terrestrial atmosphere are to be considered, because there is a fluctuation in the deposits of interplanetary material. The observations show that fluctuation of density over a period of one or more days is not going higher than the amplitude of ±20%. *Subject Headings:* **1. Air density 2. Exosphere 3. Satellite observations.**—*A. V.*

10.7–98 551.507.362

Descamps, Alphonse, **Satellites artificiels et fusées.** [Artificial satellites and rockets.] *Belgium. Institut Royal Météorologique, Contributions*, No. 44, **1958.** 21 p. table, eqs. **DLC**—This succinct but very clear report includes three parts. The first one recalls the principles and ideas of mechanics involved in artificial satellites present interest (earth attraction, terrestrial potential, releasing speed and circular speed). The second part deals with satellites (satellization energy, revolution time of the satellite, plane of the orbit, absolute and relative paths and elliptic orbits). The third part is concerned with rockets (propelling by a rocket and propulsive power of a rocket, thermal efficiency, specific consumption, propelling efficiency of the rocket, rocket stages, characteristic speed, loss through gravity and Oberth's synergic curve). *Subject Headings:* **1. Satellite observatories 2. Rockets.**—*A. V.*

10.7–99 551.507.362:535.34

Delobeau, F., **Observations scientifiques des satellites russes.** [Scientific observations of the Russian satellites.] *L'Age Nucléaire*, Paris, No. 8:46–51, Jan./Feb. **1958.** 8 figs. **DLC**—Comments on the first results, still provisional and approximate, of the satellite observations. All of them concern "external studies" as next to nothing is known about the instruments carried by the satellites. Estimations have been made which make it possible to analyze the deviations with respect to KEPLER's theoretical ellipse and thence to value the importance of the causes of these deviations resulting principally from the flatness of the earth and the resistance of the air. For this purpose, the author describes the interferometric measurements of the Doppler effect estimation and indicates how the characteristics of the single and stable signals created by the satellites make possible studies on ionospheric propagation. Theoretical consideration of the fall of rocket carriers with the disappearance of energy is included. Some data relating to the American rocket "Farside" and to artificial meteors complete this article. *Subject Headings:* **1. Satellites observatories 2. Soviet satellite observations 3. Interferometric measurement of Doppler effect.**—*A. V.*

GEOMAGNETISM—GEOELECTRICITY

10.7–100 550.385

Dúclaux, F. and Leprêtre, B. (*both, Inst. Météor. et Physique du Globe de l'Université d'Alger*), **Étude statistique des crochets magnétiques à Tamanrasset.** [Statistical study of the magnetic "crochets" at Tamanrasset.] *Geofisica Pura e Applicata*, Milan, 40:127–144, **1958.** figs., tables, 17 refs. French and English summaries p. 127. Also in *Académie des Sciences, Paris, Comptes Rendus*, 246(8):1243–1245, Feb. 24, **1958.** **DWB**—First we compare the magnetic "crochets" given by the *I.A.G.A.—Bulletin* with the "crochets" we find in Tamanrasset records between 1949 and 1957. We find out 33% of these "crochets" and we study their frequency. The frequency follows the solar cycle, it is at a minimum during winter and greater in the afternoon than in the morning. It does not appear to follow McNish's law. The most probable amplitude is 7γ. Next, phenomena which look like "crochets" (false crochets), characterized by well defined features of dH/dt and dD/dt, were studied. Their frequency does not follow solar cycle, it is minimum at equinox and level during the course of the day. The most probable amplitude is from 7 to 10γ, and the development lasts about 1 min. The direction of disturbance vector is NNW or SSE, with predominance of SSE, which should correspond to a WSW-ENE stream in the ionosphere. The existence of false crochets may explain some confusion when we identify "crochets." *Subject Headings:* **1. Crochets 2. Tamanrasset, Algeria.**—*Author's summary.*

10.7–101 550.83

Mooney, Harold M. (*Dept. Geophysics, School of Mines and Metallurgy, Univ. Minnesota, Minneapolis*), **A qualitative approach to electrical resistivity interpretation.** *Geofisica Pura e Applicata*, Milan, 40:164–171, **1958.** 7 figs., 7 refs., 5 eqs. **DWB**—The formula for apparent resistivity can be interpreted in terms of two quantities more easily identified with the physical process involved: the distribution of current flow in the earth, as it affects the current density along a line between the potential electrodes, and the true resistivity along this line. The analysis permits a qualitative prediction of resistivity sounding and profiling data over a variety of structures. Examples are given for faults, layers, and a dipping dike. *Subject Headings:* **1. Geological prospecting 2. Electrical resistivity in earth.**—*Author's summary.*

10.7–102 523.75:550.38

Grafe, Armin (*Dipl.-Beophys. Adolf-Schmidt-Observ. für Erdmagnetismus in Niemegk, Kreis Belzig*), **Einige charakteristische Besonderheiten des geomagnetischen Sonnenerup-tionseffektes.** [Some characteristic peculiarities of the geomagnetic solar flare effect.] *Geofisica Pura e Applicata*, Milan, 40:172–179, **1958.** 6 figs., 9 refs. German and English summaries p. 172. **DWB**—The most important results of a statistical research of geomagnetic sfe's are discussed, based on recordings of the observatory in Potsdam, Seddin and Niemegk during the last 65 yrs from 1890–1956. It is made evident that the frequency of sfe's follows the sunspot period of 70–80 yrs and has a seasonal variation with two equinoctial-maxima and an extreme summer-minimum. Otherwise the well-known east-west-asymmetry of the sunspots and eruptions has been proved also for the eruptions producing the sfe's. Finally, a lag of the phases between SQ- and sfe-current vector was found. *Subject Headings:* **1. Solar flares 2. Solar-magnetic relationships.**—*Author's summary.*

SEISMOLOGY

10.7–103, 550.34(09)

Richter, C. F. (*California Inst. of Technology*), **New dimensions in seismology.** *Science*, Wash., D. C., 128(3317):175–182, July 25, **1958.** 6 figs., table, refs. **DLC**—The history of seismology is offered as an introduction to some recent developments within the instrumental field, of which a new logarithmic scale of magnitude is discussed in the sense of the fifth dimension of seismology. This magnitude scale, which supplements rather than replaces the intensity scale, permits estimation of strain released in minor events, and plots the release against time. It also determines the expected maximum aftershock in any event, and decides whether or not it is a true aftershock or the beginning of a new event. *Subject Headings:* **1. History of seismology 2. Seismology.**—*W.N.*

AERONAUTICAL METEOROLOGY

See also: **Wind aid-retard tables** (U. S. W. B.), 10.7–38; **Correspondence course manuals for pilots** (Taylor), 10.7–50; **Air Weather Service manuals** (U. S. A. F.), 10.7–52.

10.7–104 551.513.2:551.57.5:629.13

Reynolds, P. R. J. and Chandler, C. L. (*both, Pan American World Airways*), **Flying the jet stream.** *Canadian Aeronautical Journal*, Ottawa, 4(3):86–93, March **1958.** 9 figs. **DLC**—The genesis, anatomy, forecasting, types and details of the Atlantic jet stream (both horizontal and vertical) and its use in flight planning, inflight techniques, interception and evasion are discussed and well-illustrated by synoptic examples and navigation details. *Subject Headings:* **1. Jet stream flying 2. North Atlantic.**—*M.R.*

10.7–105 551.551.5:629.13

Rhyne, Richard H. (*Langley Aeronautical Lab., Langley Field, Va.*), **Measurements of the motions of a large swept-wing airplane in rough air.** *U. S. National Advisory Committee for Aeronautics, Technical Note* 4310, Sept. **1958.** 22 p. 8 figs. (incl. photos), 2 tables, 8 refs., 4 eqs. **DLC**—The results of a flight investigation of the angular and linear motions of a large swept-wing airplane in rough air for altitudes of 5000 and 35,000 ft are summarized in the form of sample time histories, power spectra, root-mean-square values, and probability distributions. *Subject Heading:* **1. Turbulence effects on aircraft.**—*NACA abstract.*

10.7–106 551.551:629.135.2

Cole, Robert O. and Chamberlain, Lloyd W. (*both, Natl. Wea. Analysis Center, U. S. W. B., Wash., D. C.*), **Vertical wind shears near the core of the jet stream over the northeastern United States, Aug. 1–2, 1958.** *Monthly Weather Review*, Wash., D. C., 86(8):319–327, Aug. **1958.** 6 figs., 2 tables, 8 refs. **DWB, DLC**—One of the most valuable uses of knowledge of vertical wind shears is their application to planning optimum flight paths for jet aircraft. In forecasting winds for aircraft, their use as an incremental term has tended to simplify the task of interpolating winds between standard constant pressure levels. Furthermore, from the standpoint of flying safety and passenger comfort, the observation of extreme vertical shears has been helpful in identifying regions of possible clear air turbulence. On Aug. 1, 1958 there was evidence that strong vertical wind shears existed near the core of the jet stream over the northeastern U. S., and within 24 hrs the magnitude of these shears had diminished considerably. Wind shears computed directly from rawin reports (see Table 1) indicated values as large as 21 kt/1000 ft. Shears of this magnitude greatly exceed the value of 10 kt/1000 ft which has been regarded as flight path (1). The purpose of this article is to analyze the conditions under which these extreme vertical wind shears occurred and to demonstrate their effective usefulness by integrating them into a vertical wind shear chart. *Subject Headings:* **1. Vertical wind shear 2. Upper air wind forecasting 3. Jet flight planning.**—*Authors' abstract.*

10.7–107 551.509.21:551.582:629.13(725.39)

§Knudsen, John, **Aviation meteorology of Sola Airport, Stavanger.** *Meteorologiske Annaler*, Oslo, 4(9):159–202, **1958.** 10 figs., 31 tables, 15 refs. **DLC**—The first part of this paper deals with some of the main factors controlling the synoptic weather and the climate of Sola Airport. The second part describes the different air mass weather types and frontal weather types with special regard to the circumstances which led to formation of poor weather conditions at the airport. The method used was: The synoptic weather charts for the five-year period 1950–54 were classified according to the air mass types which the charts showed to be present at Sola. This was followed by examination of the meteorological journals for the same period. All cases of poor weather conditions were examined and related to the particular synoptic weather type which at the same time affected the airport. The third part of the paper discusses some of the main climatic elements on the basis of statistical tables. With regard to cloud and visibility, it appeared that in the five-year period reviewed, visibility under 2 km occurred in about 3 and under 1 km in about 1% of the total number of hours "Bad-weather" conditions, with visibility and/or cloud ceiling under 1.2 km and 100 m

pectively, occurred in about 2.4% of the hours. The poorest conditions were usually found sunrise and in the cold season. *Subject Headings:* **1. Airport climate surveys 2. Climate Sola Airport, Stavanger 3. Stavanger, Norway.**—*Author's abstract.*

0.7–108 551.511.13:551.558.21

†Zierep, Jürgen (*Inst. für Theoretische Gasdynamik de D.V.L., Aachen*), **Das Leewellenoblem der Meteorologie.** [The problem of lee-waves in meteorology.] *Die Naturwissenaften*, Berlin, 45(9):197–200, May **1958.** 5 figs., 34 refs., 6 eqs. **DLC**—The problem of wave effect is of great importance for aviation. The author gives the answer to the question: What happens to a horizontal current when it passes over an obstacle on the ground in atmosphere composed of stable layers. This is followed by a comment on the LYRA theory ating of the case of stationary currents, without friction over a two dimensional obstacle. velopment of the LYRA theory during the last 15 yrs is given. *Subject Headings:* **1. Lee ves 2. Lyra theory 3. Orographic effects on winds.**—*A.V.*

AGRICULTURAL METEOROLOGY

See also: **Conservation by shelter belts** (Sus), 10.7–10; **Snow cover surveys, U.S.S.R.,** 10.7–43; **Spring frosts** (Krick), 10.7–172; **Frost forecast for fruit growers, Japan** (Kuribayashi), 10.7–173; **Radiation frost prevention** (Angus), 10.7–223; **Freeze data analysis, Worcester, Mass.** (Dye), 10.7–225.

10.7–109 551.501.9:63

Semenets, E. P., **Opyt raboty agrometeorologicheskogo posta v kolkhoze im. Karla bknekhta (Odesskoĭ oblasti).** [Sketch of the work of the agrometeorological post at the arl Liebknecht collective farm (Odessa Region).] *Meteorologiia i Gidrologiia*, Leningrad, o. 2:42–43, **1958. DWB, DLC**—The agrometeorological station which was organized in 57 carries out observations on precipitation, soil moisture and temperature under different ops and developmental stages of crops, on snow cover, etc. Various examples of the special rvices rendered by the agrometeorological station on the Karl Liebknecht collective farm e cited. These included forecasting the dates of appearance of mildew, the determination adequate soil moisture in the spring and summer so that sprinkling was not necessary, daily servations on soil temperature at depths of 5–10 and 20 cm in order to determine the optimum tes of planting maize, etc. *Subject Headings:* **1. Agrometeorological stations 2. Odessa egion, U.S.S.R.**—*I.L.D.*

10.7–110 551.508.5:551.556.3:63

Vinter, A. V. and Fateev, E. M., **Ispol'zovanie energii vetra v sel'skom khoziaĭstve.** [Use wind energy in agriculture.] Moscow, Akademiia Nauk S.S.S.R., **1955.** 108 p. 36 figs., tables, eqs. **DLC** (TJ825.V53)—A technical pamphlet for widespread distribution (7500 pies) giving the basic facts about wind, wind machines and their construction, use and tentialities for future development, especially in desert, semi-arid or remote regions having enty of wind, uses for milling, pumping, irrigation, etc. and types of machines recommended each purpose are stipulated. The first chapter goes into wind measurement techniques, emometers, wind characteristics, diurnal and seasonal variations, instantaneous variations, quencies and calculations of energy parameters. Types of equipment used, data for use in nstruction and calculations and effectiveness are described and illustrated by photos, line awings, graphs and tables. *Subject Headings:* **1. Wind energy utilization, U.S.S.R. 2. Anemometers 3. U.S.S.R.**—*M.R.*

10.7–111 551.577:551.521.1:551.573:633

Scholte Ubing, D. W., **De invloed van de watervoorziening en de totale instraling op de brengst van aardappelen.** [The influence of water supply and total radiation upon the ld of potatoes.] *Landbouwkundig Tijdschrift*, Wageningen, 70(6):453–464, June **1958.** igs., 4 tables, 7 refs. **DA**—The influence of water supply upon the yield of potatoes and the y matter production in tubers was examined on four groups of potato varieties by investigat-

ing the water balance of the root zone during the growing period in clay soil near Wageningen. The potential evapotranspiration E_0 and the evaporation of a free water surface E_T were estimated from the energy balance over periods of 10 days. The influence of the total water deficit during the growing period of each group and the yield and weight of 5 kg tubers under water is given. The author gives: a) The relation between the yields and the quotient precipitation (**N**) + water storage in soil (B) and E_0; b) The correlation between the total precipitation during the four growing periods in each year and the yield and the total dry matter production; c) The influence of the total radiation upon the water consumption and upon the increase of yield and the total dry matter production. The global radiation during the growing period in the Netherlands can be a reducing factor in the production of potatoes and of other crops. Precipitation and the total radiation give, in this case, a better correlation with yield and dry matter production than the estimation of the potential evapotranspiration or the water deficit, since a certain part of the radiant energy is taken up by the soil. *Subject Headings:* **1. Water supply 2. Global radiation 3. Potential evapotranspiration 4. Potato yield.**—*A. V.*

10.7–112 551.524.371:632.111.3

Perraudin, M. G., **Le problème de la lutte contre les gelées printanières vu sous l'angle économique.** [The problem of the fight against late frosts from the economic point of view.] *Le Fruit Belge*, Liège, 26(202):94–101, June **1958.** 2 tables. **DA**—Examination of the economic aspect of the fight against frost. Two methods which gave positive results are considered: a) water sprinkling b) heating of the atmosphere. From experiments made in Switzerland, it appears that frost protection through heating of the atmosphere is advantageous; the sprinkling method, which is scientifically established, has not been perfected but it is entirely successful in strawberry-plant cultivation. *Subject Headings:* **1. Frost protection 2. Late frosts.**—*A. V.*

10.7–113 551.524.371:632.111.3

Lemaître, R., **La lutte contre les gelées tardives par arrosage.** [The fight against the late frosts by sprinkling.] *Le Fruit Belge*, Liège, 26(199):41–47, March **1958.** 4 figs., 4 refs. **DA**—Theoretical, practical and economical survey of the fight against late frosts by sprinkling. The principle of the procedure is to cover the sensitive parts of the plants with ice and to maintain this ice at a temperature close to 0° with water supplied during the whole of the frost period. The author mentions the equipment needed, the time at which the sprinkling must be done and the required water quantity. A sprinkling outfit costs B. Frs. 50,000 per hectare; the upkeep is relatively low. This outfit is also convenient for other work, such as irrigation, pulverization, etc. *Subject Headings:* **1. Frost protection 2. Sprinkling.**—*A. V.*

10.7–114 551.524.371:632.111.3

Goruchon, Roger, **La lutte anti-gel par aspersion.** [The fight against frost through sprinkling.] *Agriculture*, Paris, 197:19–23, Jan. **1957.** 10 figs. **DA**—Study based on experiments made in Germany during 1956 and in France on the nights of May 6 and 7, 1957. The author demonstrates that the sprinkling method is the most inexpensive antifrost method. In this method, the heat supply is marked by the initial heat of the sprinkled water and by the freezing warmth which plays the main part. For this method to be effective, the spraying should be begun between 0° and −1° and carried on continuously; it is also necessary that the sprinkling be as fine as possible. *Subject Headings:* **1. Frost prevention 2. Sprinkling.**—*A. V.*

10.7–115 551.584:634.8

Burckhardt, Hans, **Zur Abhängigkeit des Bestandsklimas in Weinbergen von der Erziehungsform der Reben.** [Dependence of the plant climate in vineyards on the method of cultivation of the vines.] *Meteorologische Rundschau*, Berlin, 11(2):41–47, March/April **1958.** 4 figs., 9 tables, 10 refs. **DWB, DLC**—Microclimatic studies on the behavior of the meteorological climates within vineyards both within and between stands are summarized and a method is described for measuring the stand climate in vineyards with the aid of the Dier thermoelectric psychrometer. Comparative measurements were made between vines i

nds attaining heights of 90 and 150 cm above the ground but with rows of equal width, nely 120 cm. In the stand the vertical temperature gradient is positive only when the und is warmed by the sun; it is negative during the remainder of the day and is zero at ht; this effect is less marked in the lower stands. The vapor pressure gradient is almost ays positive and is greater in the lower than in the higher stands; in both it is greater than the open country. The temperatures in the higher stands are always lower than in the n country; very little difference exists between the temperatures of the low stands and the n country. The crown area of tall vines has a higher temperature by day and a lower nperature at night than the open land. The crown layer of the lower stands behaves in an posite manner to that of the tall stands. This difference is a consequence of excess of oming radiation over transpiration in the tall stands as compared with the lower stands. mparative measurements between a wide vine stand (height of crown 2–10 m, width of vs—3 m) and a normal (height of crown 1.20 m, width of rows—1.20 m) were made in g. 1957 during a synoptic situation marked by a cold front, cloudiness, light showers and rtial clearing. The climate of wide plantings showed a greater uniformity resulting from a wing down of the horizontal mixing and better incoming radiation conditions. The crown a of the wide plantings had a greater variation than that of the normal planting; this is ributed to the greater foliage mass which raises the temperature depending upon radiation change and lowers temperature by evaporation. The grape area of the wide plantings nifested microclimatic deficiencies, low temperature level and high atmospheric humidity day. These deficiencies although slight, are very important at the start of the blossoming d maturation phases. *Subject Headings:* **1. Vineyard microclimatology 2. Viticulture.** *I.L.D.*

10.7–116 . 551.524.371:632.111.3

Schnelle, F. and Schneider, M., **Teilweise Frostschäden trotz Frostschutzberegnung: fahrungen aus dem Frühjahr 1957.** [Frost damage in spite of frost protection by sprinkler igation: Experiences in the spring of 1957.] *Klosterneuburg, Austria. Höhere Bundeslehr- id Versuchsanstalt für Wein-, Obst- und Gartenbau, Mitteilungen, Ser. A, Rebe und Wein,* 6):302–310, Nov. **1957.** 4 figs. English, French and Spanish summaries p. 309–310. A—The authors investigate some causes of inefficiency in the sprinkler irrigation system of ost protection. Sometimes ring-like damages occurred when, though the same quantity of ater was used, it was applied in bigger drops; consequently, less densely, which happens equently some distance from the sprinkler. Finally, the forward moving of the sprinkler ay cause one section to be repeatedly not at all or scarcely wet, which effects, within the itical range of temperatures, damage to either one. *Subject Headings:* **1. Frost protection Sprinkling.**—*Authors' abstract.*

10.7–117 551.586:631.8

van der Paauw, F. (*Inst. of Soil Fertility, Groningen*), **Relations between the potash equirements of crops and meteorological conditions.** *Plant and Soil,* The Hague, 9(3):254–68, March **1958.** 7 figs., 2 tables, 13 refs. **DLC**—Significant correlations have been found etween the response of potatoes, spring wheat and, to some extent, canary grass to applications potash and the number of rainless days during the growing period. The effects of applications of potash showed that: 1) the tuber yield of potatoes was higher, 2) the depression of the nder water-weight of the tubers was less, and 3) the K_2O content of the tubers was lower, dry years thereby indicating a decreased availability of soil potash in these years. The ositive effect of applications of potash on the grain yield of wheat was highest in dry years. mple applications of potash were found to depress yields in wet years which is also an indication of higher availability of potash in wet years. In the case of canary grass greater increases the K_2O content of the straw after applications of potash were found in wet years. No gnificant correlations were found in the case of bean crops. The influence of weather conditions on the response to potash is probably greatest during emergence and the early phases of rowth. In later periods the influence is slight. *Subject Headings:* **1. Bioclimatology Weather influence on plant response to potash 3. Potash requirements of crops.**—*Author's ostract.*

FOREST METEOROLOGY—FIRE WEATHER

See also: **Forest fire lookout manual,** 10.7 48; **Forest effects on snow cover** (Baldwin), 10.7–291.

10.7–118 551.586:632.187(758)

*Krueger, Daniel W. (*Southeastern Forest Experiment Station, Southern Forest Fire Lab., Macon, Ga.*), **The relation of monthly fire occurrence in Georgia to mean monthly values of weather elements.** U. S. Weather Bureau, (**1958**). 7 p. 6 figs., 5 tables. Mimeo. Presented at the 2nd National Conference on Agricultural Meteorology, 170th National Meeting of the American Meteorological Society, Oct. 22–24, 1958, New Haven, Conn. **DWB** (M:634.9 U587re)—The monthly number of forest fires in Georgia from 1951 to 1958 were compared with monthly mean values of weather elements to determine the relationship of fire danger severity to one or more of these elements. Although variations in human behavior unrelated to weather contribute to fire occurrence, a parameter composed of two of these weather elements, 1:30 p.m. relative humidity and maximum temperature, was found to be highly significant. This parameter was then used to estimate frequency of severe fire conditions from 1918 to 1951 when complete fire records were not maintained. *Subject Headings:* **1. Fire weather studies 2. Georgia.**—*Author's abstract.*

10.7–119 551.509.52:632.187(795,797)

*Cramer, Owen P., **Test of wind predictions for peak fire-danger stations in Oregon and Washington.** *U. S. Forest Service. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, Research Paper,* No. 22, July **1957.** 41 p. 6 figs., 12 tables, foot-refs. **DA**—Owing to the greater weight given to wind speed in rating fire danger, the author studied the relative success of wind speed forecasts during the fire seasons of 1950–1951. The spot forecasts prepared by three fire weather forecast centers of the U. S. W. B. for 11 peak stations within the forests of Oregon and Washington were compared with routine area forecasts, with forecasting aids suggested by forest protection agencies and with some routine statistical forecasts often used in comparing accuracy of forecast methods. The prediction methods, the design of the study and the evaluation of forecast accuracy are described. The results of the study indicate the following: 1) accuracy of methods tested varied significantly between stations and no one method was best for all stations, 2) the area forecast gave significantly poorer results than other methods, 3) spot forecasts issued in the morning were no more accurate than those issued the previous evening, 4) all methods showed least accuracy on the more important days, hence practicality of using forecasts as a basis for regulating fire protection activities must be determined locally. *Subject Headings:* **1. Wind forecasting accuracy 2. Fire danger rating 3. Oregon 4. Washington.**—*Author's summary and I.L.D.*

10.7–120 632.187(741)

*Keetch, J. J. and Gladstone, M. C., **1952 forest fires and fire danger in Maine.** Asheville, N. C., U. S. Forest Service. Southeastern Forest Experiment Station, July **1953.** 70 p. 2 figs., 60 tables. **DWB** (634.96 U586ni)—Tables and graphs of forest fires and fire danger in the state of Maine for 1952 are presented in this report, which is the tenth in a series of reports covering the period beginning with October 1942. Tabulated data here are compared with those in the 1951 report and the highlights of 1952 data are given too. The report covers the district boundaries of Maine, the location of danger stations and forest areas protected, the burning index, fire occurrence, and season ratings by years 1943–52, number of days, fires, acres burned and the percent of fires by cause. *Subject Headings:* **1. Forest fire data 2. Fire danger 3. Maine.**—*N.N.*

10.7–121 551.586:632.187(795,797)

Cramer, Owen P. (*Div. of Forest Management Res., U. S. Pacific N. W. Forest and Range Exp. Station, U. S. Forest Service*), **Forest fire weather in Western Oregon and Western Washington.** *U. S. Forest Service. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, Research Note,* No. 154, Nov. **1957.** 9 p. 5 tables. **DA.** Also his **Forest fire weather . . . 1958.** *Ibid.,* No. 163, Nov. **1958.** 9 p. 5 tables. **DA**—The weather

ditions during the 1957 and 1958 fire seasons are described. Fire indexes for western gon and for western Washington, and additional data on the number of days with low tive humidity, and high burning index, are presented. *Subject Headings:* **1. Fire weather ditions 2. Oregon 3. Washington.**—*I.L.D.*

INDUSTRIAL METEOROLOGY

See also: **Solar control and shading devices** (Olgyay, V. and A.), 10.7–18; **Tropical climate test chambers** (Fritsche, Kahl), 10.7–40; **Wind energy utilization, U.S.S.R.** (Vinter, Fateev), 10.7–110; **Workroom temps.** (Yoshimoto), 10.7–214.

10.7–122 620.91:551.521.1

Hottel, Hoyt C. (*Dept. Chemical Eng., Mass. Inst. Tech.*) and Whillier, Austin (*Nat. ysical Lab., Pretoria*), **Evaluation of flat-plate solar collector performance.** (In: Conference the Use of Solar Energy, Univ. of Arizona 1955, **Transactions,** pub. **1958.** Vol. 2:74–104. figs., 5 tables, 9 refs., 13 eqs.) **DWB**—Among the fields of interest in solar energy utilization those of domestic hot-water supply and house heating, where it is recognized that the use the radiant energy from the sun as a source of thermal energy is now, or probably soon l be, both practical and economical; and the fields of air conditioning, heat pumps (as a at source), and power generation, where future developments may lead to use. Since rious collector designs and modes of operation must be compared, it is desirable so to organize e calculations as to carry them as far as possible in the direction of allowing for the influence weather variability before making any commitment as to the kind of collector or its mode operation. The present method achieves that objective by organizing solar radiation data o a form suitable for the rapid calculation of the performance of any kind of nonfocusing ar-collection equipment and hence the rapid determination of the size of solar collector uired for a given application. In addition, design curves that are based on the method of culation outlined in the paper are presented for localities throughout the U. S. and other ected parts of the world. *Subject Headings:* **1. Solar energy utilization 2. Solar collectors.** *Authors' abstract.*

10.7–123 551.521.1:620.91

Gier, J. T. and Dunkle, R. V. (*both, Dept. Eng. Univ. of Calif., Berkeley*), **Selective spectral aracteristics as an important factor in the efficiency of solar collectors.** (In: Conference the Use of Solar Energy, Univ. of Arizona, 1955, **Transactions,** pub. **1958.** Vol. 2:41–56. figs., tables, 7 refs., 25 eqs.) **DWB**—This paper discusses the selective spectral character- ics of materials as evaluated from experimental data revealing the fact that most thermal diators and absorbers differ greatly from ideal or Planckian (perfect) radiators both totally d spectrally; this latter phenomenon can be used advantageously in improving the efficiency solar absorbers. Sample spectral data are presented. A simple analysis of the efficiency a solar absorber from a radiometric point of view is included. *Subject Headings:* **1. Solar ating 2. Spectral absorption 3. Solar collectors.**—*Authors' abstract.*

10.7–124 551.521.1:697.1

Buehberg, Harry (*Dept. of Eng., Univ. of Calif., Los Angeles*), **Circuit analysis applied to lar house-heating.** (In: Conference on the Use of Solar Energy, Univ. of Arizona, 1955, **ransactions,** pub. **1958.** Vol. 3:1–30. 7 figs., 9 refs., 15 eqs.) **DWB**—The problem of the tilization of solar energy for house-heating may be considered in three parts: 1) The conception collection and storage devices and arrangements, 2) The prediction of the thermal behavior systems subjected to solar heating, and 3) The actual observation of the performance of mponents and systems. This paper deals mainly with the second aspect. The thermal- rcuit representation of a house, including the solar input circuit and interior radiation ex- hange network, is presented and discussed. Some typical solutions by electric analogue mputation are given. The network representation of a solar heating arrangement and its corporation in the house circuit is also discussed. Nomenclature and symbols are com- letely described at the end of the paper. *Subject Headings:* **1. Heating of houses 2. Solar eating.**—*Author's abstract.*

MEDICAL METEOROLOGY

See also: **Med. met. symposia, Hamburg** (Undt), 10.7–67; **Bioclimat. conf.** (Undt), 10.7–68; **Pollen counts, Lucknow** (Lackhanpal, Nair), 10.7–182; **Air-sea temp. variations, Poland Coast** (Tyczka), 10.7–215.

10.7–125 551.586:616

Zink, O. (*Hamburg*), **Die Therapie meteorotroper Krankheitserscheinungen und ihre Problematik.** [Therapy of meteorotropic diseases and the problems involved.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:33–37, **1958. DWB**—The present status of our knowledge of the relationship between weather and disease, the prediction of biological responses to weather, and therapy of meteorotropic diseases are discussed. Weather influences, mood, performance, capacity, appearance of cardiac symptoms in cardiac patients, occurrence of glaucoma, the cause of epidemics, etc. are also reviewed. Ordinary weather forecasts (which have an average reliability of 84% in Hamburg) of temperature, cloudiness, etc. are not useful in forecasting meteorotropic effects since the latter are associated with fronts, air masses, up and down glides, inversions, etc. While these phenomena can be predicted with an accuracy of 90%, the biological reactions to them do not have this accuracy since individual responses are influenced by other factors, such as constitution or reaction type, diet, etc. The possibilities of therapy are discussed by examples of the use of special cages for preventing the penetration of high frequency radiation (sferics), the use of air conditioned rooms for eliminating particular aerosols, medication acting both upon the central and autonomic nervous systems, and diet. *Subject Headings:* **1. Meteoropathology 2. Weather sensitivity.**—*I.L.D.*

10.7–126 551.571:551.586:612.5

Iampietro, P. F.; Bass, David E.; Buskirk, E. R. and Vaughn, J. A., **Heat exchanges of men in the cold: effect of humidity, temperature, and windspeed.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Division, Technical Report* EP-99, Sept. **1958.** 11 p. 4 figs., 6 tables, 8 refs. **DWB** (M86 U585t)—Six healthy young men were exposed nude during 2 hr exposure periods to various combinations of wind (<1 and 10 mph), temperature (50° and 60°F), and relative humidity (30% and 95%). These conditions have been identified with cold-wet environments by meteorologists. Skin and rectal temperatures, oxygen consumption, and subjective sensations were recorded. The results indicate that wind had the greatest impact on both the subjective and physiological responses; dry bulb had a marked although lesser effect. Relative humidity had little or no effect on any of the responses except heat production. Thus, under the conditions of this study, little evidence was found for an important role of humidity, *per se*, on either body heat exchanges or subjective sensations of cold. *Subject Headings:* **1. Cold effects on man 2. Body heat regulation 3. Chilling bioclimatology.**—*Authors' abstract.*

10.7–127 551.526:551.586:616.925

Turner, H. S., **[Comments on] E. N. Lawrence: Poliomyelitis and water temperature [and reply on Lawrence].** *Meteorological Magazine*, London, 86(1026):374–375, Dec. **1957.** 5 refs. **DWB**—Several possible factors which might be responsible for the fact that polio is most common in late summer when water temps. are highest are discussed by TURNER and LAWRENCE. Salt depletion due to more frequent bathing and proximity of many people during bathing season complicate the correlation of simple weather or water parameters. (For abstract on original, *see* 7.10–65, Oct. 1956, *MAB.*) *Subject Headings:* **1. Water temperature effects on poliomyelitis 2. Poliomyelitis.**—*M.R.*

10.7–128 551.521.18:551.586:616

Knepple, Rudolf (*Potsdam*), **Zur Biotropie der atmosphärischen Wärmestrahlung.** [Biotropism of atmospheric heat radiation.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:149–156, **1958.** 4 figs. **DWB**—The pathological effects of infrared radiation upon the human organism are discussed. Studies are cited indicating that overhead ceiling heat radiation causes sensations of pressure on the head and that infrared radiation

eeding 0.7 g cal/cm² is unpleasant and that its action is mediated through the autonomic vous system involving a stimulation of the vagal effect. The climatic importance of nter radiation and its possible physiological role, especially in relation to sultriness, is sidered. The influence of cloudiness on sultriness is shown to be decisive on the basis of nputations relating infrared radiation of the atmosphere to air temperature and the sultriness its of LINKE and SCHARLAU. An analysis of the symptoms of sultriness indicates that they nprise such sensations as exhaustion, depression, headache, migraine, etc. A study of the nifestations of these symptoms in two groups indicated that they occurred almost exsively when the computed atmospheric radiation exceeded 0.49 g cal/min. Also evidence licating that specific weather situations having deleterious effects upon tubercular patients characterized by high intensities of atmospheric radiation is presented. The possible chanism of the action of infrared radiation is regarded as a displacement of the autonomic *us in the vagotonic* direction. *Subject Headings:* **1. Infrared radiation effects on man 2. Bio-teorology.**—*I.L.D.*

ASTRONOMY

10.7–129 523.16:538.3

Akasofu, Syun-Ichi (*Geophysical Inst., Tohôku Univ., Japan*), **The helicoidal structures the cosmical electrodynamics.** *Tellus*, Stockholm, 10(4):409–414, Nov. **1958.** 19 refs., eqs. **DLC**—The general-type solution of the equation [curl(curl $H \times H$)]=0 are studied the cylindrical systems, according to LUNDQUIST's and CHANDRASEKHAR's methods. In neral, the magnetic fields are of helicoidal type in the cylindrical systems. Several examples e studied in the cosmical fields. *Subject Heading:* **1. Cosmical electrodynamics.**—*Author's stract.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Center for Physics of the Globe, Dourbes** (Lahaye), 10.7–44; **Observers' manuals and agromet. obs., U.S.S.R.,** 10.7–51; **Stations reporting pressure reduction,** 10.7–75; **Agromet. stations, Odessa Region** (Semenets), 10.7–109; **Evapotranspiration meas. tech., Thames River Basin** (Cochrane), 10.7–249.

10.7–130 544.65:551.501:551.551.8

Robinson, Elmer; MacLeod, J. A. and Lapple, C. E. (*all, Stanford Res. Inst.*), **A meteorogical tracer technique using uranine dye.** *Journal of Meteorology*, Boston, 16(1):63–67, eb. 1959. 3 figs., 4 refs. **DWB, DLC**—A water-soluble fluorescent-dye aerosol has been sed successfully as a meteorological tracer. Because of simple instrumental analysis of field mples and great sensitivity, the technique offers large savings in the cost of tracer studies. he aerosol consists of 2- to 10-micron particles of uranine, generated by pneumatic atomization f a solution. The analysis is based on the fluorescence of a uranine-water solution. The ensitivity of the analysis is 10^{-10} g (corresponding to a single 5-micron particle) and samples s small as 10^{-9} g have been analyzed readily. The technique has been applied to a field rogram involving evaluation over distances up to 8 mi during periods of maximum atmospheric iffusion. *Subject Headings:* **1. Fluorescent tracers 2. Uranine dye 3. Diffusion measurement techniques.**—*Authors' abstract.*

10.7–131 551.501.4:551.511.6

Grundy, N. A. (*Met. Service of Canada*), **[Comment on] Roy E. Peterson: Comparative tudies of relative vorticities computed from geostrophic and observed winds, [and Reply y Peterson.]** *Journal of Meteorology*, Boston, 15(3):335–336, June **1958.** 2 tables. **DWB, LC**—GRUNDY remarks that ROY PETERSON's statement, in the *Journal of Meteorology*, 4(4):367–374, Aug. **1957** (*see* 8.11–163, Nov. 1957, *MAB*), to the effect that halving the grid

size doubles the geostrophic vorticity at the central point, is incorrect, for the finite-difference technique always yields the true Laplacian of height, and hence, the geostrophic vorticity, if the height variation has the form of a 3rd or a lower order polynomial. If it has the form of a 4th or higher order polynomial, then the estimate will be a function of grid size. PETERSON agrees and gives comparative values in tables for mean height differences for winter in 4 directions, using small and large scale. Also he shows that height variations along the axial directions cannot be adequately described in terms of a given 3rd or lower, or a 4th or higher order polynomial, so uncertainty still exists as to true values. *Subject Heading:* **1. Vorticity computations.**—*M.R.*

10.7–132 551.501.42:551.501.74:061.3

*Rao, K. N. (*Met. Office, Poona*), **International barometer conventions and tables.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(2):137–154, April **1957.** 10 tables, 5 refs. 55 eqs. **DWB, DLC**—An exhaustive analysis of differences among several standard barometer conventions used within and outside meteorological services. Corrections for temperature, density, gravity, height above sea level and even the standard scale, conversion units, etc. are considered. A new international system as recommended by the WMO Commission on Instruments and Methods of Observation (CIMO) in Toronto in 1953 is presented as a model to supersede that now used by the Indian Meteorological Service. *Subject Headings:* **1. International Barometer Conventions 2. Barometer reduction tables 3. Pressure reduction 4. Indian Meteorological Service 5. WMO, CIMO Toronto 1953.**—*M.R.*

10.7–133 551.501.7:551.507.352:551.515.2

La Seur, N. E., **An analysis of some detailed data obtained by aircraft reconnaissance of a hurricane.** Florida. State Univ. Dept. of Meteorology, Contract AF (604)-753, Scientific Report No. 5, Sept. 30, **1957.** 25 p. 11 figs., 17 refs.—Hurricane structure at 500 mb is analyzed in this report. The analyses are based on the most detailed data available to date, collected during a special aircraft reconnaissance program in 1955. Wind, temperature, pressure, radar echo and other data were obtained at intervals of about a mile by a B-29 equipped with a newly developed electronic navigation system. The photographic recording system recorded the data automatically. Methods of observation and the detailed analyses are documented. *Subject Headings:* **1. Aircraft hurricane reconnaissance 2. Hurricane reconnaissance.**—*N.N.*

10.7–134 551.501.771:551.573

Elnesr, M. K., **Sur la détermination de l'évaporation dans l'atmosphère.** [Determination of atmospheric evaporation.] *Journal Scientifique de la Météorologie*, Paris, 8(31):111–115, July/Sept. **1956.** table, 6 refs. French, English and Spanish summaries p. 111. **DWB**—BOWEN's ratio, an important factor in the study of evaporation, has been determined by using a precise apparatus for measuring humidity as well as temperature gradients. The measurements were undertaken for 3 consecutive layers of air near a surface covered with short grass. No variation of this ratio with height was found. *Subject Headings:* **1. Evaporation measurements 2. Bowen's ratio.**—*Author's abstract.*

10.7–135 551.501.774:551.508.74:551.574.41

Krečmer, Vladimír, **Několik poznámek k Duvdevaniho rosoměrné metodě.** [Notes on Duvdevani's method of dew measurement.] *Meteorologické Zprávy*, Prague, 11(2):45–47, **1958.** photo, 6 refs. Czech, Russian and English summaries p. 45. **DLC**—The author compares frequency of dew nights according to observations with a drosometer devised by DUVDEVANI and frequency according to the conventional visual method used at all climatological stations. He draws the conclusion that the DUVDEVANI method does not cover about 50% dew nights as compared with visual observation if carefully performed. Analysis of the causes are given. The comparison of dew amounts according to drosometer data with intensities of dew deposition shows little reliability, notably in medium intensities of dew deposition. The author suggests that DUVDEVANI's dew measuring apparatus may be used for microclimatic investigations and local climatic studies rather than in climatological station

tworks. *Subject Headings:* **1. Dew measurement techniques 2. Duvdevani dew gage.**—*uthor's abstract.*

10.7–136 551.501.81:551.594.7

Atlas, David (*GRD, AF Camb. Res. Center, Mass.*), **Meteorological "angel" echoes.** *urnal of Meteorology*, Boston, 16(1):6–11, Feb. **1959.** 9 figs., 11 refs. **DWB, DLC**—New bservations of a variety of "angel" echo phenomena were made during 1957. These may be ouped into four types: (1) echoes from thermal columns below cumulus clouds; (2) mantle-aped echoes associated with the boundaries of cumulus clouds; (3) layer echoes associated th sharp vertical gradients or minima in moisture aloft; and (4) anomalous low-level echoes lieved to be produced by the boundary surfaces between differentially moistened surface air er adjacent cold and warm water. These observations and those previously reported of sea eeze angels constitute impressive empirical proof of the association between angel echoes and eteorologically induced gradients in refractive index. However, it is still not possible to count for the observed angel cross-sections theoretically using "reasonable" gradients of fractive index. The regular observation of elevated blobbly angel layers indicates that nditions are frequently suitable for enhanced forward-scatter beyond the horizon of other-ise line-of-sight electromagnetic waves. Furthermore, the data testify to the feasibility and markable foresightedness of FRIEND's 1939 proposal to use radio reflections for the continuous unding of air-mass boundaries. *Subject Heading:* **1. Angels.**—*Author's abstract.*

10.7–137 551.501.81:551.553.8

De, A. C. (*Met. Office, Dum Dum*), **A northeasterly squall at Dum Dum airport during he pre-monsoon season of 1957—a radar study.** *Indian Journal of Meteorology and Geo-hysics*, Delhi, 9(4):371–376, Oct. **1958.** 5 figs., 6 refs. **DWB, DLC**—A northeasterly squall hich struck Dum Dum airport during the pre-monsoon season of 1957 was studied with the elp of the meteorological radar installed at the Meteorological Office, Dum Dum airport, alcutta. It was shown that the movement of the isolated Cb cells may be controlled by the revailing upper winds at 10,000 ft and above. The wind currents up to 5000 ft were found o be responsible for the movement of the northeasterly squall lines in the Gangetic West engal. *Subject Headings:* **1. Radar analysis of squalls 2. Squalls 3. Dum Dum Airport, alcutta, India.**—*Author's abstract.*

10.7–138 551.501.81:551.509.318:551.515

Fujita, Tetsuya (*Univ. of Chicago*), **Study of mesosystems associated with stationary adar echoes.** *Journal of Meteorology*, Boston, 16(1):38–52, Feb. **1959.** 18 figs., 12 refs. **DWB, DLC**—Mesosystems associated with stationary radar echoes were analyzed. Five of hem occurred on July 20, 1956 over the area of the U. S. Weather Bureau's Severe Local torms Network, and they grew to 300–400 mi in diameter. Divergence and vorticity at ach 1000 ft level inside a composite mesosystem were computed up to 5000 ft. It is found hat the wind field is rotational up to 3000 ft where it becomes irrotational. Appreciable livergence reaching over 100×10^{-5} per sec on the ground decreases linearly to 30×10^{-5} per ec at the 5000 ft level. Computed vertical velocity inside the mesosystems was about 1 ft er sec at 1000 ft reaching 3 ft per sec at the 5000 ft level. A small system of Aug. 13, 1947 ver the Thunderstorm-Project area was also studied; it was only 20 mi in diameter. Com-arison of the characteristics of these systems indicated that the systems, large and small, nay be produced by similar processes. (For same abstract from another source, *see* 10B–177, eb. 1959, *MAB.*) *Subject Headings:* **1. Mesoanalysis 2. Radar echoes from mesosystems 3. U. S. Weather Bureau Severe Local Storm Network.**—*Author's abstract.*

10.7–139 551.501.81:551.515.8

Ligda, Myron G. H. and Bigler, Stuart G. (*both, Agric. & Mech. College of Texas*), **Radar choes from a cloudless cold front.** *Journal of Meteorology*, Boston, 15(6):494–501, Dec. **958.** 4 figs., 8 refs. **DWB, DLC**—A recent radar observation of a line of echoes associated vith a fast-moving cold front is described. The novel feature of the observation was the com-lete absence of any precipitation and cloud formations to which the echoes would otherwise

be attributed. Various conceivable explanations for the possible cause of the echoes are examined and it is concluded that the most plausible cause resides in microwave scattering by index of refraction gradients. A frontal model is deduced which, if correct, serves to explain efficient mixing of air of different refractive index. The meteorological significance of the observation is examined and suggestions offered for further work. *Subject Headings:* **1. Radar echoes from cloudless cold fronts 2. Cold front models.**—*Authors' abstract.*

10.7–140 551.501.9:551.584.5:551.582.2(42)

Glasspoole, J., **Effects of the change of site on the climatological observations at Camden Square, London.** *Royal Meteorological Society, Quarterly Journal,* 85(363):65–67, Jan. **1959.** table. **DWB, DLC**—At a Special General Meeting of the Royal Meteorological Society held in the Society's rooms on Dec. 19, 1957, it was agreed that 62 Camden Square should be sold because the maintenance of the property had become an increasing drain on the available funds. Satisfactory arrangements had been made with the St. Pancras Borough Council for the Climatological station to be transferred some 150 yds to the Gardens in Camden Square. The new station became operative in June 1957, the full observations at 62 Camden Square continuing until March 23, 1958, so that overlapping records are available for about 10 months. While a longer overlap would have been advantageous, there is already sufficient information to indicate the effect of the change. A better comparison will be possible in 5 or 10 years' time, by using the records at other stations in the London area. In 1958 the late G. J. Symons, F.R.S., set up a climatological station at his home at 136 Camden Road, a few hundred yards distant from 62 Camden Square, to which he moved 10 yrs later. When the Meteorological Office took over the station in 1919 consideration was given to its continuation in addition to those at Kew and Greenwich. It was clear that an adequate representation of the variations of rainfall and temperature over London required at least these three stations. The three stations Camden Square, Kew and Greenwich were at altitudes of 111 ft, 18 ft and 149 ft, respectively; the record at Camden Square representing the higher, northern suburbs; Kew the valley near the river to the west of London in rural surroundings; and Greenwich an isolated hill selected for astronomical purposes to the east of London. The station at Greenwich terminated in July 1952 when the Observatory moved to Herstmonceux, but the Director of the National Maritime Museum continued the record at a site nearer the river at an alt. of 24 ft. The site at Camden Square was that of a small, walled, suburban garden surrounded by rows of houses. The site in the Gardens is about 10 ft higher on ground sloping up slightly to the northeast. It is more open than that at 62 Camden Square and is mainly grass. It is dominated by six trees about 60 ft high, the open space being about 40×33 yds, and the trees subtend angles of about 40°–45° at the site. *Subject Headings:* **1. Station transfer 2. Homogeneity 3. London, Eng.**—*Author's abstract.*

OBSERVATIONAL DATA

See also: **Wind aid-retard tables** (U. S. W. B.), 10.7–38; **Upper air obs., Soviet drifting exped. SP-4** (Gaĭgerov), 10.7–58; **South Pole (Amundsen-Scott) station** (Siple), 10.7–61; **Aerological soundings, Adélie Land** (Gilbert), 10.7–62; **IGY rocket program,** 10.7–64; **CSAGI 4th Antarctic conf., Paris 1957,** 10.7–65; **Historic weather records, U. S.** (Havens), 10.7–81.

10.7–141 551.506.1(058)(437)

*Lomnický, Štít, Czechoslovakia. Observatoria, **Ročenka poveternostných pozorovaní.** [Yearbook of meteorological observations], 1955. *Czechoslovakia. Štátní Meteorologický Ústav v. Praze, Publickácia, Ser. D,* Vol. 10, 1955, pub. **1957.** 75 p. Almost entirely tables. **DLC**—Tables of data for pressure, temp., vapor pressure, wind, cloudiness, sunshine, relative humidity, visibility, etc. for 1955, the 13th year of publication. Data for each hour are taken from barograph, thermograph, hygrograph, anemograph and heliograph records; for other element 3-hourly readings are used. Anomalous conditions (departure from normal) are mentioned in text. In monthly and annual summaries the frequencies of wind direction and speeds are given. *Subject Headings:* **1. Annual meteorological data summaries 2. Yearbooks 3. Lomnický Štít, Czechoslovakia.**—*M.R.*

INSTRUMENT CARRIERS

See also: **Satellite obs.** (Shternfel'd), 10.7–19; **Falling sphere sounding for upper air density** (Jones, Bartman), 10.7–39; **IGY rocket program,** 10.7–64; **Satellite optical obs.,** 10.7–90; **Satellites** (Faust), 10.7–91; **Satellite obs., U.S.S.R.** (Paetzold), 10.7–92; **Interplanetary flights** (Oort), 10.7–93; **Vanguard I.** (Raimond), 10.7–94; **Satellite weight** (Jarry), 10.7–95; **Meteoric dust erosion of satellites** (Hoenig), 10.7–96; **Air density and satellite obs.** (Paetzold, Zschörner), 10.7–97; **Rockets** (Descamps), 10.7–98; **Soviet satellite obs.** (Delobeau), 10.7–99; **Aircraft hurricane reconnaissance** (La Seur), 10.7–133.

10.7–142 551.507.3:551.557.3

†Angell, J. K. (*U. S. W. B.*), **Lagrangian wind fluctuations at 300 mb derived from transonde data.** *Journal of Meteorology,* Boston, 15(6):522–530, Dec. **1958.** 11 figs., table, 15 refs. **DWB, DLC**—The dependence upon frequency of the variance and cross variance of zonal-meridional and natural ageostrophic wind components is determined for twelve 300 mb transosonde flights of 60 to 130 hrs duration. The main peaks in the variance of these components occur at periods near 50 hrs and are associated with the transit time of the transosondes through long waves in the westerlies. Two of the longest flights have a secondary peak in the variance of the zonal wind component at a period of 12 hrs. For fluctuations of period near 50 hrs, the cross variance indicates that the zonal wind component is usually a maximum slightly upstream from the trajectory crest, and that the maximum flow towards low pressure consistently occurs near the inflection point downstream from the trajectory trough line. The evidence for inertial oscillations is inconclusive, partly due to the difficulty in resolving inertial oscillations and fluctuations associated with the long waves in the westerlies for flights of the above duration. Transosonde positions obtained from photographs of the underlying terrain along one flight give information on relatively high frequency fluctuations but, pending the analysis of more such data, generalization is not attempted. *Subject Headings:* **1. Upper air wind fluctuations 2. Transosonde data.**—*Author's abstract.*

INSTRUMENTS

See also: **Aerological soundings, Adélie Land** (Gilbert), 10.7–62; **Duvdevani dew gage** (Krečmer), 10.7–135; **Liquid water content measurement** (Braham et al.), 10.7–253; **Atmos. potential gradient meas.** (Lugeon), 10.7–296.

10.7–143 551.508.21

Ångström, Anders (*Met. & Hydrological Inst., Stockholm*), **On pyrheliometric measurements.** *Tellus,* Stockholm, 10(3):342–354, Aug. **1958.** 7 figs., table, 16 refs., 27 eqs. **DLC**—Pyrheliometric measurements are now introduced in the meteorological practice to an extent which makes a condensed survey of the present status desirable. In the following, the main content of the survey on the pyrheliometric scales, given by the International Radiation Commissions, has been combined with a description of the present modernized type of the Ångström pyrheliometer. A critical examination of its function and the sources of error which ought to be avoided in its operation has been added. A detailed survey of its construction seems justified by the fact that it is the only standard instrument at present available in the market, where institutes can easily determine its physical constants, thus controlling the basis for absolute measurements of solar radiation. An Annex contains a simple theory of the "edge effect" in the pyrheliometer. The main content of the annex coincides practically with the theory given in 1914, but is repeated here with some minor corrections, together with a discussion of the factors influencing the effect and also of the results of practical experiments. The important result derived is that the edge correction is to some extent dependent on the internal convection within the pyrheliometer, and may from this reason vary between about 1.3 and 3.8% of the measured radiation. In the new instruments, now available in Sweden, this error is eliminated. *Subject Heading:* **1. Ångström pyrheliometer.**—*Author's abstract.*

10.7–144 551.508.21

Lindholm, Ferdinand (*Swedish Met. and Hydrological Inst., Stockholm*), **The Ångström compensation pyrheliometer and the absolute pyrheliometric scale.** *Geofisica Pura e Ap-*

plicata, Milan, 41:177–182, **1958.** 3 tables, 10 refs. French summary p. 177. **DLC**—In a preliminary study the mean marginal error due to the edge-effect of the old standard pyrheliometer of ÅNGSTRÖM is found to be +2.4%. A series of the new model Å pyrheliometer designed at the Laboratory of the Swedish Meteorological and Hydrological Institute has given the same result concerning the discrepancy between the new model and the standard model of the Ångström pyrheliometer. The new scale based on calculated constants of the Å pyrheliometers without any marginal error gives one per cent higher values than the Smithsonian absolute scale of 1948. According to the Smithsonian Institution this remaining difference is due to an error in the Å original and also in the new pyrheliometers, caused by a laterally reflected radiation on the back of the strips. This problem will be subjected to further experiments. *Subject Headings:* **1. Ångström pyrheliometer 2. Pyrheliometric scales.** —*Author's summary.*

10.7–145 551.508.29

Unger, K., **Eine Thermobatterie mit kompensierter Vergleichstemperatur für mikrometeorologische Temperaturmessungen.** [A thermal battery with compensated temperature standard for micrometeorological temperature measurements.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 8(3/4):378–381, **1957.** 3 figs., 2 refs. **DLC**—With the aid of a photograph and diagrams, the author describes the construction of a radiation free thermoelectric battery which consists of 20 to 40 elements and possesses sufficient EMF so as to render unnecessary the preliminary intensification of the thermal current. The battery is balanced by a special compensating circuit in such a way that the temperature variation of the opposed soldered joints is maintained constant by at least 0.1°C. This circuit makes it possible to carry out micrometeorological measurements of temperature by means of thermocouples, using relatively robust multiple recording instruments without maintaining a constant comparison temperature. *Subject Headings:* **1. Thermoelectric batteries 2. Micrometeorological temperature measurement techniques.**—*I.L.D. and author's summary.*

10.7–146 551.508.43:551.541

Berg, Hellmut (*Met. Inst. Universität Köln*), **Mikrostruktur und Mikrosynoptik des Luftdruckfeldes.** [Microstructure and microsynoptics of the atmospheric pressure field.] *Geofisica Pura e Applicata*, Milan, 40:203–216, **1958.** 15 figs., 4 refs. German and English summaries p. 203. **DWB**—Micro-oscillations of air pressure were registered near Cologne with three microbarographs at three points at a distance of 7 to 16 km. One can distinguish several different types of microbarograms; examples of which are given. The evaluation of them and the problems of the microsynoptics of the air pressure field—especially the velocity of the microstructures—are discussed. *Subject Headings:* **1. Pressure microvariations 2. Microbarographs.**—*Author's summary.*

10.7–147 551.508.54:529.78

Lang, Aug. and H. R. Scultetus, **Die Zehnerkontakt-Markierung—ein Hilfsmittel für die Auswertung von Chronographen Registrierungen.** [The tenth contact indicator: an aid in the evaluation of chronograph records.] *Germany. Deutscher Wetterdienst. Instrumentenamt Hamburg, Technische Mitteilungen des Instrumentenwesens des Deutschen Wetterdienstes*, n.s., No. 3:22–24, **1957.** fig. **DWB**—The evaluation of wind velocity records obtained by means of contact anemometers is simplified by marking every tenth contact, for example. A telephone speaker counter is inserted parallel to the writing magnet of the chronograph, which is in a series with the battery and the contact anemometer. At every contact of the anemometer, the telephone is moved by one number. After every number of wheel rotations corresponding to 10 contacts of the anemometer, a supplementary built-in contact pair is locked into the counting mechanism. A diagram of the chronograph with tenth contact marking is presented and the advantages and disadvantages of the device are discussed. *Subject Headings:* **1. Chronographs 2. Anemometers.**—*I.L.D.*

10.7–148 551.508.54

Andreev, I. D., **Tochnost' izmereniia skorosti vetra stantsionnym samopistsem M-12.** ccuracy of wind-speed measurements with the station self-recorder M-12.] *Meteorologiia i lrologiia*, Leningrad, No. 2:45–46, **1958.** fig., table, ref., eq. **DWB, DLC**—The station -recorder M-12 records simultaneously mean wind velocity every 10 min with an upper it of measurement of 40 m/sec, and wind direction in 16 rhumbs. The operation of this trument is very simple. Wind velocity records containing 775 four-hour intervals were alyzed by computing mean wind velocity and deviations from the mean for 10, 20, 30, 40, 80 and 120 min. The dispersion of the relative deviations of wind velocity from the mean

$$\mu^2 = \frac{1}{N} \sum_{i=1}^{N} \left(\frac{\Delta u}{u} \right)_i^2$$

s computed for each time interval, and a graph of $\mu^2 = \alpha \ln \eta + \mu_0^2$ was constructed for each T/τ, μ_0^2 square of the systematic error). The graphical exclusion of systematic error and results of determinations of systematic error for different wind velocities are presented. view of a small mean square relative error ($\pm 5.3\%$) the M-12 self recorder is very satis-tory. *Subject Heading:* **1. Wind speed recorders.**—*I.L.D.*

10.7–149 551.508.85:551.557

Barbé, Georges D., **Sur la mesure radioélectrique de la vitesse et de la direction du vent squ'à une altitude dépassant 30 km.** [Measurement of wind direction and wind speed by dioelectricity, up to altitudes above 30 km.] *Académie des Sciences, Paris, Comptes Rendus*, 6(23):3266–3269, June 9, **1958.** 2 figs., 2 refs. **DLC**—Utilizing swarm ascents with in-vals of 1 hour, the author shows the small importance of turbulence in upper atmosphere culation. The instrument in use was a radar unit, working on a 10 cm wave length and llowing automatically a metallic "passive" reflector of the trirectangular, trihedral type sociated with a balloon, representing the sensible organ of the measurement. *Subject eadings:* **1. Radar measurement of upper air wind 2. Upper air wind measurement tech-ques.**—*A.V.*

10.7–150 551.508.91:551.521.17:551.574.11

Knof, Hans (*Dipl.-Phys. Physikalisches Inst. Univ. Frankfurt a. Main*), **Die Erzeugung n Kondensationskernen durch ultra-violettes Licht und ihr Nachweis mit Hilfe einer iffusionsnebelkammer.** [Production of condensation nuclei by ultraviolet light and their entification by means of a diffusion cloud chamber.] *Geofisica Pura e Applicata*, Milan,):180–186, **1958.** 4 figs., 11 refs. German and English summaries p. 180. **DWB**—In a ffusion cloud chamber, filled with organic vapors, neutral condensation nuclei were produced ultraviolet light. It was possible to divide these condensation nuclei into three groups, stinguished by size and time of life. It was demonstrated that the smallest condensation uclei were free organic radicals (e.g. CH_3). *Subject Headings:* **1. Condensation nuclei forma-on 2. Cloud chamber studies 3. Ultraviolet light effects on nuclei.**—*Author's summary.*

10.7–151 551.508.91:551.574.11

Murphy, Thomas (*Dublin Inst. for Advanced Studies*), **The precision nucleus counter Pollak type) with automatic recording.** *Geofisica Pura e Applicata*, Milan, 41:194–200, **1958.** figs., 2 refs. German and English summaries p. 194. **DLC**—In order to obtain an automatic cording nucleus counter with greater accuracy than that of Verzár, a precision photoelectric ucleus counter (Pollak type) with ceramic lining and internal diameter 2.5 cm has been bstituted for the horizontal fog tube in Verzár's automat. Certain small alterations have ėn made to the electric circuit of the recorder. The new arrangement can be easily calibrated id shows an accuracy approaching that of the precision counter operated under optimum nditions. *Subject Headings:* **1. Condensation nuclei recording instruments 2. Pollak uclei counter.**—*Author's summary.*

10.7–152 551.508.91:551.574.11

Pollak, L. W. and Daly, J. (*Dublin Inst. for Advanced Studies*), **An improved model of the condensation nucleus counter with stereo-photomicrographic recording.** *Geofisica Pura e Applicata*, Milan, 41:211–216, **1958.** 3 figs., 4 refs. German and English summaries p. 211. **DLC**—A new model of the condensation nucleus counter with stereo-photomicrographic recording is described which is distinguished by perfect symmetry in its construction, reduced turbulence, two separate microscopes with photographic attachments and a novel dark-field illumination which eliminates complete fogging of the graticule even after prolonged use of the instrument. A view-finder microscope permits observations of the graticule so that the instrument can also be used for counting nuclei by eye. When the graticule is removed, the droplets can be photographed in space stereoscopically. The use of the counter and its accessories is described and the dimensions and range of the instrument given. *Subject Heading:* **1. Condensation nuclei recording instruments.**—*Authors' summary.*

10.7–153 551.508.91:551.551.8

Pollak, L. W. and Metnieks, A. L. (*both, Dublin Inst. for Advanced Studies*), **A universal diffusion battery.** *Geofisica Pura e Applicata*, Milan, 41:201–210, **1958.** fig., 2 tables, 7 refs., 25 eqs. German and English summaries p. 201. **DLC**—In order to examine the explanation, put forward to us privately, that the marked influence of air flow on the value of diffusion coefficient as determined by the dynamic method is due to unequal flow through the channels of the diffusion apparatus used hitherto, a novel diffuser—called Universal Diffusion Battery—has been constructed in which the air flow through each channel can be equalized. The new diffusion battery is described and its advantages outlined. Its application also shows that, with equal flow through each channel, the dependence of the diffusion coefficient on the air flow (i.e., that higher diffusion constants with higher flow rates are obtained) still exists. A comparison of the diffusion coefficients as measured with the diffusion batteries of the old and new types is given. The explanation based on irrefutable theoretical considerations that this dependence of the diffusion coefficient on the air flow is caused by the heterogeneity of the condensation nuclei in the aerosol, as given by Pollak & Metnieks some time ago, is apparently the correct one or it accounts at least for the greatest part of the phenomenon. *Subject Headings:* **1. Cloud chambers 2. Universal diffusion battery.**—*Authors' summary.*

10.7–154 551.508.94:551.594.11

Chalmers, J. A. and Smiddy, M., **The double field mill.** Durham, England, Univ. Contract AF 61(514)-891, Technical Note No. 1, Oct. 15, 1955 to Oct. 14, **1956.** 14 p. 4 figs. (incl. photo), 5 refs., eqs.—In order to measure the potential gradient at a point in the atmosphere a few meters above ground level, a double mill has been constructed by Gunn (1948), Gish and Wait (1950) and others, to eliminate the effect of the aircrafts' charge by using the difference of the two effects. The theory of the instrument used is described in the research paper. By plotting the mill potential against plate potential, the curve fails to pass through zero due to a charge being carried vertically up the driving belt and affecting the bottom plate mill output. The second result of the test showed that the slopes for positive and negative fields do not exactly correspond, the reason also being the charged driving belt. The fact that the plot gives a straight line shows that the mill will function in the desired way. The amplifier output was also plotted against plate potential. The negative values of output just indicate that they are 180° out of phase with outputs for positive fields. The zero field output is due to the effects of the driving belt. The entire structure is then erected outside for a practical operation. *Subject Headings:* **1. Potential gradient meters 2. Double field mill.**—*N.N.*

10.7–155 551.508.94:551.594.2

Kobayashi, M. and Kitagawa, N. (*both, Met. Res. Inst.*), **Recording apparatuses for use in studies of field-change due to lightning discharge.** *Papers in Meteorology and Geophysics* Tokyo, 8(1):102–106, April **1957.** 5 figs. (incl. photo), 6 refs., eq. **DWB**—In electrical study of lightning discharge, it is essential to record faithfully the field-change due to a lightning discharge during the whole duration. For this purpose the authors used simultaneously two different methods of observation, i.e., an electrostatic fluxmeter and an amplifier oscillograph

slower field-change, having longer duration than 1 m-sec up to the static field, was recorded an electrostatic fluxmeter, while the faster change, having shorter duration than 1 m-sec, an amplifier oscillograph. Operating these apparatuses we can record correctly all the ld-changes, whether slow or fast, due to various processes in the lightning discharge, and e of several microseconds can be resolved. *Subject Headings:* **1. Electrostatic fluxmeters mplifier oscillographs 3. Lightning recorders.**—*Authors' abstract.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Numerical forecast. studies, Japan,** 10.7–1; **Long range forecast. texts.** (Baur), 10.7–3; **Hydrologic forecast. text.** (Popov), 10.7–12; **Nongeostrophic models of atmos. flow** (Edelmann), 10.7–27; **Arctic weather analysis** (Reed), 10.7–57; **Climate, Sola Airport, Norway** (Knudsen), 10.7–107; **Fire danger rating, Oregon, U. S.** (Cramer), 10.7–119; **Radar echoes from mesosystems** (Fujita), 10.7–138; **Differential advection** (Keitz), 10.7–196; **Synoptic conditions for heavy rainfall, Delhi State** (Mooley), 10.7–266.

10.7–156 551.509.3:551.515.12(75)

§Di Loreto, Edmund A. and Hamada, Masaru (*both, U. S. W. B.*), **The cold low over utheastern United States, July 1–6, 1958.** *Monthly Weather Review*, Wash., D. C., 86(7): -283, July 1958. 7 figs., 7 refs., eqs. **DWB, DLC**—During the summer months anti-lonic circulation persists at the surface over southeastern U. S. The airmass is usually ner convectively unstable or in the process of becoming so, due to strong day-to-day insola-n and the availability of moisture from the Gulf of Mexico and the Atlantic Ocean. Because ntal systems and surface cyclonic circulation are lacking, showers and thunderstorms that ur in this airmass have been attributed to the release of conditional instability by surface ting regardless of the extent of the activity. Studies by Byers and Rodebush (1), and ers, indicate that thermal instability, though a necessary condition, is not in itself sufficient se for the development of widespread cloudiness and thunderstorm activity. Baum's dy (2) indicated that the occurrence of thunderstorms in Florida cannot be determined rely from the standpoint of thermodynamics, even when the moisture parameter is taken o consideration. Widespread cloudiness and shower activity are always associated with atively large-scale zones of convergence that are dynamically induced. In this study an empt will be made to explain, on the basis of dynamically induced convergence, the cloud d precipitation pattern that developed with the upper cold Low circulation over southeastern S., July 1–6, 1958. *Subject Headings:* **1. Cold lows, Southeastern United States (July 58) 2. Synoptic studies 3. Southeastern United States.**—*Authors' abstract.*

10.7–157 551.509.3:551.509.5:519.24

Harris, Miles F. (*U. S. W. B.*), **An evaluation of 12-hr statistical forecasts of the 1000- to 0-mb thickness.** *Journal of Meteorology*, Boston, 16(1):1–5, Feb. 1959. 5 tables, 5 refs., qs. **DWB, DLC**—The usefulness of a number of variables as predictors of the 1000–500 mb ickness is explored. These predictors are utilized, in several combinations, to form multiple gression equations from which four series of 12-hr thickness forecasts are prepared. Verifica-n scores are presented and compared with the scores of 12-hr numerical thickness predictions the same period. *Subject Headings:* **1. Statistical forecasting 2. Forecast verification.**—*thor's abstract.*

10.7–158 551.509.312:551.557.2:551.511.32

*§Leese, Horst, **Synoptisch-statische Untersuchungen über den Zusammenhang zwischen öhenströmung und Luftdruckänderung am Boden.** [Synoptical-statistical investigations the relation between upper air currents and atmospheric changes at the surface.] *Berlin. eie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 3), 1957. 55 p. 36 figs., 9 tables, 33 refs. Biog. note p. 55. **DWB**—Scherhag's diver-nce law is qualitatively and quantitatively tested, especially with respect to diffluence and ociated pressure changes in a multiple-layer atmosphere. Synoptic cases (intense and

slight pressure change) on Jan. 14/15, and 29/30, 1952 and Dec. 12/13, 1952, are examined; statistical tests applied, annual and regional variations in the diffluence considered, and the results presented in tabular, graphical and verbal form, accompanied by numerous synoptic surface and upper air charts. *Subject Headings:* **1. Differential kinematics 2. Scherhag's divergence law 3. Diffluence.**—*M.R.*

10.7–159 551.511.6:551.509.313

Adem, Julián (*Univ. Nacional de México, Inst. de Geofísica*), **On the relation between pressure and wind, with particular reference to a vortex.** *Tellus*, Stockholm, 10(3):326–330, Aug. **1958.** tables, 6 refs., 13 eqs. **DLC**—It is shown that if the boundary conditions to solve the vorticity and balance equations are prescribed independently, then the primitive equations of motion are not satisfied. Given the wind field of a symmetrical vortex embedded in a resting atmosphere, analytical expressions for the pressure and wind tendency are derived. A numerical example is worked out and the results are used to obtain information regarding the effect of the boundary conditions and of the variation of the Coriolis parameter in a forecast with a barotropic model. *Subject Headings:* **1. Vorticity equations 2. Balance equation 3. Numerical forecasting techniques.**—*Author's abstract.*

10.7–160 551.511.6:551.509.313

Benton, George S. (*Johns Hopkins Univ., Balto., Md.*), **Some comments on the numerical integration of the vorticity equation and related equations.** *Tellus*, Stockholm, 10(3):313–325, Aug. **1958.** 5 figs., 2 tables, 3 refs., 23 eqs. **DLC**—It is shown that if the stream function is specified over an Eulerian region $R(x,y)$ at $t=0$, and on the boundaries of $R(x,y)$ at $t>0$, a solution of the vorticity equation which satisfies certain conditions of continuity will be unique. If vorticity is also specified at the inflow boundary, such a solution is excluded. In the latter case, an internal discontinuity propagates into the region along a material surface, and in principle solutions should be obtained separately for each sub-region and "matched" kinematically and dynamically at the interface. The associated analytical or numerical problems are prohibitive. The problem of obtaining stable methods of numerical integration, specifying only the stream function on the boundary, is considered. Numerical integrations of a nonlinear first order differential equation indicate that such stable methods may exist, in contradiction to linear theory. The integration of the vorticity and associated equations for the first time-step is also considered. A method is presented which is not only simple to apply, but also maintains the same accuracy as succeeding time-steps for which centered difference techniques are used. *Subject Headings:* **1. Vorticity equations 2. Integration techniques 3. Numerical forecasting techniques.**—*Author's abstract.*

10.7–161 551.509.313:551.509.5

Berggren, Roy (*Swedish Met. & Hydrological Inst., Stockholm*), **Comparative studies of 500 mb barotropic forecasts based on different analyses.** *Tellus*, Stockholm, 10(3):289–298, Aug. **1958.** 3 figs., 7 tables, 11 refs., 5 eqs. **DLC**—Some barotropic 500 mb forecasts are compared in the following ways: 1) comparison of the differences between forecasts made from analyses with identical boundary regions but different inner parts; 2) comparison of forecasts made from two independent analyses based on identical material; and 3) comparison between forecasts based on two analyses with identical inner region but different boundary regions. The result of a computation of the standard deviation of the vorticity and the Jacobian J (η, φ) is given and discussed, the deviation being due entirely to the personal factor in upper air analysis. *Subject Headings:* **1. Forecast verification 2. Numerical forecast errors.**—*Author's abstract.*

10.7–162 551.509.313:551.509.329:551.547

Brandejs, S. and Zikmunda, O., **Über die numerische und graphische Vorhersage des Bodendruckfeldes.** [Numerical and graphical prediction of surface pressure fields.] *Zeitschrift für Meteorologie*, Berlin, 11(10/11):305–311, Oct./Nov. **1957.** 9 refs., 32 eqs. **DWB DLC**—The authors develop prognostic equations of a baroclinic field with a moving divergence free level and with a fixed divergence-free level. For the former the isoboric layer p_0-p_s is

dered and $p_0=100$ cb and $p_s=50$ cb. On the assumption that the wind shear in the given tion is constant and that the change of an absolute amount is expressed by the linear ion of pressure $\alpha(p)=(p_0-p_s)(p_0-p_s)^{-1}$ then the wind vector V is represented at every by $V(x,y,p;t)=V_0(x,y;t)+\alpha(p)V^1(x,y;t)$. The deviation and solution of the equations he simultaneous numerical prediction of absolute topography of the isobaric surface p_0, relative topography of the isobaric layer p_0-p_s, and the dynamic components of the cal velocity w is developed as follows:

$$\nabla_p^2\frac{\partial z_0}{\partial t}+J_p[z_0,g\lambda^{-1}\nabla_p^2z_0+\lambda]+\tfrac{1}{2}g\lambda p_0[(p_0-p_s)RT_0]^{-1}J_p[z_0,H]+2\lambda^2\tilde{\omega}[g(p_0-p_s)]^{-1}=0,$$

$$\frac{\partial h}{\partial t}=-g\lambda^{-1}J_p[z_0,h]-Rg^{-1}\epsilon\Gamma_p\tilde{\omega}+gp_0\sigma\Gamma_p(\lambda T_0)^{-1}J_p[z_0,H]$$

$$+2\lambda^2[R\epsilon\Gamma_p(p_0-p_s)]^{-1}\}(\Gamma_p\tilde{\omega})-g(R\epsilon)^{-1}J_p[h,g\lambda^{-1}\nabla_p^2(2z_0+h)+\lambda]$$
$$-g^2p_0\sigma(R\epsilon\lambda T_0)^{-1}\Delta_p^2\Gamma_pJ_p[z_0,H]=0.$$

mechanism of surface pressure changes is explained by the equations—

$$\frac{\partial z_0}{\partial t}=-J_0[z_0,g\lambda^{-1}\Delta_p^2z_0+\lambda)-J_p[h,g\lambda^{-1}\nabla_p^2(2z_0+h)+\lambda]-\tfrac{1}{2}g\lambda p_0[RT_0(p_0-p_s)]^{-1}J_p[z_0,H]$$
$$+g^{-1}R\epsilon\Gamma_p\nabla_p^2\tilde{\omega}-gp_0\partial\Gamma_p(T_0\lambda)^{-1}\nabla_p^2J_p[z_0,H].$$

the fixed divergence free level, the prognostic equations are—

$$\nabla_p^2\frac{\partial z_0}{\partial t}+J_p[z_0,g\lambda^{-1}\Delta_p^2z_0+\lambda]+J_p[h,g\lambda^{-1}\Delta_p^2(2z_0+h)+\lambda]=0$$

$$\frac{\partial h}{\partial t}=-g\lambda^{-1}J_p[z_0,h].$$

bject Headings: **1. Numerical surface pressure forecasting 2. Pressure forecasting.**—*I.L.D.*

10.7–163 551.509.313:551.547.5

Brandejs, Stanislav; Kopáček, Jaroslav; Věková, Nina and Zikmunda, Otakar (*all, t. Inst., Charles' Univ., Prague*), **Zur Anwendung der Fjörtoftschen Methode bei der Vorsage von Höhenwetterkarten.** [Application of Fjørtoft's method in forecasting upper ather charts.] *Germany. Deutscher Wetterdienst, Berichte*, 5(38):14–18, **1957.** 5 figs., ables, 3 refs. **DWB, DLC**—In the Institute of Meteorology of Charles University (Prague), rteen 12-hr forecasts of absolute topography of the 50-mb-surface and a like number of logous 24-hr forecasts were computed with the aid of the Fjørtoft method. The barotropic ticity equation of Fjørtoft, $\partial\zeta/\partial t=-v\cdot\Delta\rho\varphi$, was solved exactly by the relationship $=\Delta\zeta+3\Delta\zeta$ for graphical calculations of these forecasts. Tables are presented giving the ecasts and their quality, as expressed by the correlation between computed and obscured dency of z, and the results of comparison of 12-hr graphically obtained forecasts with 12-hr lohypse fields, calculated by linear interpolation from momentary tendencies in two sucsive synoptic periods. During the period Jan. 29 to Feb. 1, 1953, the average correlation fficient of the 12-hr forecasts was 0.60 and of the 24-hr forecasts 0.50. The correlation for numerically computed fields was better than that of the graphically computed. *Subject adings:* **1. Fjørtoft's graphical method 2. Numerical forecasting.**—*I.L.D.*

10.7–164 551.509.313

Bristor, Charles L. (*Joint Numerical Wea. Prediction Unit, Suitland, Md.*), **Effect of data erage on the accuracy of 500-mb. forecasts.** *Monthly Weather Review*, Wash., D. C.,

86(8):299–308, Aug. **1958.** 11 figs., 2 tables, 6 refs. **DWB, DLC**—Networks of data are simulated by interpolating height and wind from a hypothetically "correct" analysis at a uniform array of points. The interpolated values are added to random numbers whose statistics are typical of nonsystematic errors of observation, and are then regarded as genuine data. Such artificially constructed "data" for several networks of different densities are analyzed independently. The differences between these analyses and the hypothetically "correct" analysis are taken to be representative of the initial analysis error under conditions of varying station density. Numerical forecasts computed from the different analyses are compared with the forecast made from the "correct" initial data. Several such comparisons indicate that initial analysis errors do not grow to an important degree so long as the spacing between synoptic reports confines error fields to a scale smaller than that of the synoptic disturbances. However, with data spacing comparable with that over existing regions of poor data coverage, initial errors are amplified two-fold in a 48-hr forecast interval. Further experiments, in which the data are analyzed objectively to eliminate inconsistencies of analysis, are carried out. *Subject Headings:* **1. Numerical forecasting evaluation 2. Network density 3. Forecasting data requirements.**—*Author's abstract.*

10.7–165 551.509.313/4:551.547.1

Cooley, Duane S. (*U. S. A. F. Camb. Res. Center, Mass.*), **Statistical forecasting operators based on dynamical equations.** *Tellus*, Stockholm, 10(3):331–341, Aug. **1958.** 6 figs., 2 tables, 11 refs., 13 eqs. **DLC**—Statistical forecasting operators are derived on the basis of a simple two-parameter model of the atmosphere. In the course of this investigation, the predictability of pressure-height changes due to the various physical processes specified by this dynamical model is investigated. It is found that the contribution of the nonlinear processes to the 12 and 24 hr predictability is small. *Subject Headings:* **1. Statistical forecasting from dynamical models 2. Pressure height calculations.**—*Author's abstract.*

10.7–166 551.511.32:551.509.313

Cressman, George P. (*U. S. W. B., Suitland, Md.*), **Barotropic divergence and very long atmospheric waves.** *Monthly Weather Review*, Wash., D. C., 86(8):293–297, Aug. **1958.** 4 figs., table, 8 refs., 9 eqs. **DWB, DLC**—The problem of spurious retrogression of very long waves by the nondivergent barotropic forecasts is shown to be the same problem discussed extensively by Rossby, Yeh, and Bolin. This difficulty is due to the failure of the nondivergent model to allow properly for the mutual adjustment of wind and pressure fields. The equation of continuity for a homogeneous incompressible fluid with an upper free surface, proposed as a remedy by Rossby nearly 20 yrs ago, removes much of the difficulty. Further improvements are obtained by inclusion of a tropopause in the manner adopted by Bolin. The results of a series of 10 test forecasts are shown in verification of the function of the divergence in a barotropic model. *Subject Headings:* **1. Barotropic models 2. Divergence analysis 3. Atmospheric waves.**—*Author's abstract.*

10.7–167 551.509.313:551.509.5

Martin, Donald E. (*Internat. Met. Inst., Stockholm*), **An investigation of systematic errors in the barotropic forecasts.** *Tellus*, Stockholm, 10(4):451–465, Nov. **1958.** 10 figs., 9 refs., 11 eqs. **DLC**—Forecast-errors in the 24- and 48-hr barotropic 500 mb prognostic charts prepared by JNWPU for the winter of 1957 were investigated. Certain large-scale forecast errors were found to persist from day to day in fairly localized geographical areas. In general, the numerical prognoses exhibited a tendency to forecast excessively high values off the southeastern coasts and excessively low values off the northwestern coasts of the continents. Little forecast-error was observed in the continental interiors. A Fourier analysis revealed that the forecast errors were largely due to incorrect phase forecasts for wave numbers 1 through 4. The forecast-errors associated with wave number 1 usually "positioned" the large-scale systematic forecast-errors near Japan and Scandinavia and contributed materially to their intensities. Relationships between forecast-error fields and topography, geography, synoptic situation, and "nonadiabatic" heating are discussed. Hemispheric fields of "nonadiabatic" heating, computed by using a two-level model, are shown. Charts illustrating the dependence

onadiabatic" heating on the general circulation are also shown. *Subject Heading:* **merical forecast errors.**—*Author's abstract.*

0.7–168 551.509.313:551.551:551.558.21 551.511.3

awyer, J. S. (*Met. Office, Dunstable*), **The introduction of the effects of topography into ods of numerical forecasting.** *Royal Meteorological Society, Quarterly Journal*, 85(363): 3, Jan. **1959.** fig., 2 tables, 24 refs., 18 eqs. **DWB, DLC**—The experience of weather asters makes it clear that mountain barriers have important effects on the movement and lopment of depressions and anticyclones. The distribution of land and sea also appears odify the tracks of depressions. It is important, therefore, that the effects of topographic ures should be incorporated in the models used as a basis for numerical weather prediction r as this is possible. However, the dynamical mechanism by which hills and mountains ence the large-scale weather systems are not yet fully understood, and it is the purpose of present paper to survey the mechanisms most probably involved, to assess their relative rtance and to indicate the manner in which appropriate modifications might be made to the i-geostrophic models of numerical forecasting. The motions which are set up in an air- m as it crosses a mountainous area are not solely, or even primarily, on the horizontal e which is treated by the equations used in numerical weather prediction, but it cannot ssumed that the smaller-scale motions have no effect on the behavior of the large-scale ems for which predictions are to be made by numerical forecasting. The motions which caused directly by topography can be classified broadly as follows: (a) Small-scale turbulent ion mainly in the lower troposphere; (b) Gravity oscillations which may extend upwards r as the stratosphere; (c) Oscillations about geostrophic equilibrium; (d) Quasi-geostrophic ions. The smaller-scale motions, (a) and (b), dissipate energy and act as a resistance to larger-scale motion. Only the quasi-geostrophic motions (d) can be adequately treated the equations which currently form the basis of numerical weather prediction, and even e there is a serious difficulty because the two-parameter model atmosphere, which is a venient basis for computation, assumes a vertical distribution of the amplitude of the urbance which is appropriate to depressions and anticyclones, but which may not neces- ly be appropriate to orographically-induced disturbances. The four scales of motion will considered in the sections which follow. *Subject Headings:* **1. Numerical models including ographic effect 2. Topographic effects on numerical forecasting.**—*Author's introduction.*

10.7–169 551.509.313:551.577:551.558

§Smebye, Sigurd J. (*Univ. of Chicago*), **Computation of precipitation from large-scale ical motion.** *Journal of Meteorology*, Boston, 15(6):547–560, Dec. **1958.** 17 figs., 16 refs., ıs. **DWB, DLC**—The vorticity equation and the first law of thermodynamics are used to struct a model which will account for the precipitation due to large-scale vertical motion. the derivation of the model, the quasi-geostrophic approximation is used; the thermal ıcture of the atmosphere is represented by the observed temperature at 700 mb level and a ıdard stability factor; the effect of external sources of heat is ignored while that of the ased latent heat is included by an approximation; orographic influences are included, and amounts of precipitation are computed on the assumption that all condensed water falls he earth. The model is tested on different synoptic situations in the U. S., ranging from or storms with excessive precipitation to minor developments with small amounts. The graphic influences are represented by a generalized topography obtained by smoothing, the incorporation of the effects of orography and released latent heat are found to lead to siderable improvements of the computed rainfall. On the whole, the computed patterns ainfall agree fairly well with those observed. The major deviations are found to be due convective currents superimposed upon the large-scale motion. (For abstract on this cle from another source, *see* 9.11–133, Nov. 1958, *MAB.*) *Subject Headings:* **1. Precipitation casting 2. Numerical forecasting.**—*Author's abstract.*

10.7–170 551.509.313:551.509.5

Thompson, Philip Duncan (*Joint Numerical Wea. Pred. Unit., Wash., D. C.*), **Uncertainty nitial state as a factor in the predictability of large scale atmospheric flow patterns.** *us*, Stockholm, 9(3):275–295, Aug. **1957.** 3 figs., 12 refs., 19 eqs. **DWB, DLC**—The

problem of the predictability of the atmosphere—i.e., the extent to which it is possible to predict the atmosphere with a theoretically complete knowledge of physical laws that govern it—is discussed. The mathematical treatment of the problem is concerned with the analysis of the gradual growth of "inherent" errors of prediction, due to errors in an initial state that is reconstructed from measurements at a finite number of points. By investigating the initial time derivations of the error arising from random analysis error, it is found that the increase of root-mean-square wind error in prediction over periods of a few days depends on: 1) the period of the forecast; 2) the initial root-mean-square vector wind error; 3) the difference between the characteristic scale of the initial error field and the scale of fluctuations in the true initial flow pattern; 4) the area average of the vertical wind shear between 250 and 750 mb; 5) the root-mean-square vector deviation of the wind at 500 mb from its area, and 6) the average static stability of the atmosphere. The discussion covers the predictability of barotropic and baroclinic flow, the maximum range of predictability, the predictability of zonally averaged flow, predictability as a measure of confidence in forecasts, the point of rapidly diminishing returns in the development of numerical forecasting methods, the effect of increasing the density of observing stations, and the effect of heat sources and viscosity. Appendices contain a mathematical treatment of the predictability of nondivergent barotropic flow, the predictability of baroclinic flow and the predictability of zonally-averaged barotropic flow. (*See also* 8F–134, June 1957, *MAB.*) *Subject Heading:* **1. Numerical forecast errors.**—*I.L.D. and author's summary.*

10.7–171 551.509.52:551.515.23

Jorgensen, Donald L. (*U. S. W. B.*), **Prediction of hurricane motion with use of orthogonal polynomials.** *Journal of Meteorology*, Boston, 16(1):21–29, Feb. **1959.** 3 figs., 4 tables, 14 refs., 11 eqs. **DWB, DLC**—The WADSWORTH-BRYAN method of specifying atmospheric circulation patterns is used as a basis for developing a hurricane forecasting procedure. Regression equations have been calculated using persistency and circulation parameters to give 24-hr components of motion for hurricanes threatening the middle and north Atlantic coast regions. The final forecast is expressed in terms of probability areas. *Subject Heading:* **1. Hurricane movement forecasting.**—*Author's abstract.*

10.7–172 551.509.532:551.524.37(73)

Krick, Irving P., Associates, Inc., **Spring frosts.** *American Fruit Grower*, Willoughby, Ohio, 78(3):12–13, March **1958.** figs. **DWB**—General forecasts for Feb., March, April and May 1958 are given, as well as a forecast of the date of last spring frost for general regions of the U. S., each accompanied by a chart. Last dates of spring frost are expected to be later than usual. *Subject Headings:* **1. Spring frosts 2. Frost forecasts for fruit growers.**—*G.T.*

10.7–173 551.509.532:551.524.37:634.38(52)

Kuribayashi, H., **On the forecasting of the late frost in Ehime Prefecture.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology*, 21(1):1–4, **1957.** 4 figs. In Japanese; English summary p. 4. **DLC**—In Ehime Prefecture, the orchards and mulberry trees are damaged by late frost every year. The damage to mulberry trees is especially conspicuous. Judging from the observations at Matsuyama Weather Station, the period of the first frost damage ranges from Oct. 20, to Dec. 3 (with air temperatures 11°~4°C), and the period of the late frost damage is from March 26 to May 10 (4°~10°C). The relation between the wet-bulb temperature at 3 h in the afternoon and the minimum temperature on the next morning is obtained for fine weather as well as for bad weather. The relation, on the whole, is $T_{min}=1.09T_w-4.34$, where T_w:wet bulb temperature at 3 h in the afternoon; T_{min}:minimum air temperature on the next morning. There is statistically an average difference of 3.2°C between the minimum and minimum ground temperature, but it differs according to the weather. This relation also can be represented by a linear form, $T_s=1.17T_{min}-4.36$, where T_s:minimum ground temperature. But the correlation between the minimum temperatures at Matsuyama and Kuma (situated in a mountainous region) is not so good. *Subject Headings:* **1. Frost forecast for fruit growers 2. Frost damage to mulberry trees 3. Japan.**—*Author's abstract.*

10.7–174 551.509.58:551.513.2:551.557.5

Kaufmann, Paul (*Dipl. Naturwiss. E. T. H., Flugwetterdienst Zürich-Flughafen*), **Atmosphärische Strömungs-Querschnitte.** [Atmospheric circulation cross sections.] *Geofisica Pura e Applicata*, Milan, 40:187–199, **1958.** 3 figs., 14 refs., eqs. German and English summaries p. 187. **DWB**—For the purpose of flight planning in the upper levels, the preparation of cross sections, especially through jet streams (actual and forecast), are discussed. A procedure for completing the isotachs if few data are available is given. The forecast cross section implies the future temperature field. A relation involving the advective terms arising in numerical forecasting completes this investigation, and shows that a small forecast center will not be able to prepare reliable cross sections. *Subject Headings:* **1. Jet stream forecasting 2. Isotachs 3. Flight planning 4. Cross sections.**—*Author's summary.*

WEATHER MODIFICATION

See: **Hail prevention and cloud seeding with silver iodide, Switzerland,** 10.7–32; **Radiation frost prevention** (Angus), **10.7–223.**

10.7–175 551.509.612:551.584

†Fournier d'Albe, E. M., **The modification of microclimates.** *UNESCO Arid Zone Research*, No. 10:126–146, **1958.** table, 138 refs. **DWB, DLC**—Microclimate is defined as the aggregate of the physical properties of the atmospheric environment of plants and animals, and the influence exerted upon the atmospheric environment by the intensity and spectral distribution of solar radiation, air movement, air and soil temperature, humidity of the air, and water supply by rainfall and underground water. The changes in microclimate produced by the natural growth of vegetation are examined with respect to changes induced in the radiation balance as a result of changes in level of absorption of radiation in albedo, etc. Air movement, air and soil temperature, transpiration, and water supply are extensively discussed, and the indirect influence of animals upon microclimate by their effect upon vegetation is considered. The various artificial means to modify microclimates, such as the use of windbreaks, shelter belts, frames and greenhouses to modify air movement; the day and night modification of radiation and thermal balance; modification of water balance by irrigation, cloud seeding, infiltration and runoff and the estimation of the water requirements are discussed. *Subject Headings:* **1. Microclimatic amelioration 2. Microclimatic influences.**—*I.L.D.*

10.7–176 551.509.616:551.574.11

Battan, Louis J. (*Chicago Univ.*) and Kassander, A. Richard (*Arizona Univ.*), **Randomized seeding of orographic cumuli, 1957, Pt. 3.** Chicago. Univ. Dept. of Meteorology, Cloud Physics Lab., Contract AF 19(604)-1388, Technical Note No. 15, June 1, **1958.** 11 p. 5 figs., 2 tables, 4 refs. **DWB** (M74.1 C532te No. 15)—During July and Aug. 1957, orographic cumuli over the Santa Catalina Mts. of southeastern Arizona were seeded from an airplane with AgI. The experimental design of the program involved the randomized seeding by pairs of days; one of two days with suitable clouds was seeded randomly. On 14 pairs of days, observations of the formation and spread of precipitation were made with a 3 cm height finding radar. This report describes the analysis of these data. It appears that seeding caused some changes in the precipitation processes. On the seeded days, the initial echoes were, on the average, at a higher altitude (and lower temperature) and high rates of growth of the echo tops were more frequent than on the nonseeded days. From the observations collected during 1957, one must conclude that the observed differences are not statistically significant. However they indicate the wisdom of continuing the program for at least one more year, as has already been planned. (For Pts. 1 and 2, *see* 10.6–156 and 10.6–157, June 1959, *MAB*.) *Subject Headings:* **1. Cloud seeding of orographic clouds 2. Cloud seeding with silver iodide 3. Cloud seeding evaluation, Santa Catalina Mountain, Ariz. 4. Santa Catalina Mts., Ariz.**—*Authors' abstract.*

10.7–177 551.509.616(792)

Anderson, Clair Keith, **An evaluation of the effects of summer cloud seeding in southern Utah.** Salt Lake City, University of Utah, **1956.** 33 p. 6 figs., 4 tables, 9 refs. **DLC**

(QC929.R1A55)—Evaluation of AgI seeding is presented in tabular and graphical form for tests conducted in central Utah in April 1951, through 1954, using control and target areas in Utah and adjacent portions of Colorado, Arizona, New Mexico, Nevada and Wyoming. Graph shows deviation in percent of normal of actual precipitation from computed precipitation for summer months from 1941–1954, inclusive. Conclusion is that there was an apparent increase of 10.36% of normal which would occur 7 times out of 100 by chance. Statistical evaluations is shown in detail in tables and on curves. *Subject Headings:* **1. Cloud seeding evaluation 2. Silver iodide seeding tests 3. Utah.**—*M.R.*

10.7–178 551.509.61:551.577.37:551.509.3

Elliott, Robert D. (*North American Weather Consultants*), **California storm characteristics and weather modification.** *Journal of Meteorology*, Boston, 15(6):486–493, Dec. **1958.** 2 figs., table, 17 refs., 9 eqs. **DWB, DLC**—In connection with cloud seeding projects in Pacific Coast states, detailed analyses have been prepared of many storms. From this material, average values of significant parameters have been computed and are employed to construct a model of typical cold-front-type occlusion moving into the California coast from the west, a type of storm responsible for a substantial fraction of California precipitation. The model shows some deviations from the classical cold-front-type occlusion, such as the absence of a discernible elevated warm-front surface within 150 mi of the surface cold front. The system is discussed as a steady-state mechanism wherein the generation of liquid moisture in vertical currents is balanced by its removal through precipitation, primarily in the instability zone near the surface front, and by evaporation, primarily in the altostratus zone in advance of the instability zone. The system being treated as an engine for the production of precipitation reaching the ground, its efficiency is discussed on the basis of simplified calculations of growth of precipitation in relation to ice-forming nuclei supply. It is shown that in this storm model efficiencies are normally well below 100%, and that the introduction of artificial ice-forming nuclei can raise this efficiency markedly. *Subject Headings:* **1. Storm rainfall 2. Cloud seeding potentialities.**—*Author's abstract.*

10.7–179 551.509.616:551.574.11

Facy, L. (*Météorologie Nationale, 1 Quai Branly, Paris*), **Les processus de congélation en atmosphère libre par capture des noyaux glaçogènes.** [Processes of freezing in the free atmosphere by the capture of freezing nuclei.] *Geofisica Pura e Applicata*, Milan, 40:217–226, **1958.** 4 figs., 2 refs. French and English summaries p. 217. **DWB**—The author first sets out the reasons why, in most cases, "freezing nuclei," properly speaking, do not previously play the part of "condensation nuclei." He then describes a mechanism due chiefly to the processes of molecular kinetics in which molecular diffusion alone occurs during the transfer caused by the phase changes. Effectiveness and importance of that mechanism are sufficient to explain the majority of the phenomena observed in cloud physics, particularly with techniques of artificial seeding used for producing precipitation or for antihail experiment purposes. *Subject Headings:* **1. Freezing nuclei 2. Cloud seeding.**—*Author's summary.*

10.7–180 551.509.616:551.574.11

Facy, L. (*Météorologie Nationale, 1 Quai Branly, Paris*), **L'efficacité glaçogène des noyaux d'iodure d'argent.** [Freezing effectiveness of silver iodide nuclei.] *Geofisica Pura e Applicata*, Milan, 40:227–234, **1958.** 12 refs. French and English summaries p. 227. **DWB**—The author first recalls the ideal physicochemical properties for ice forming nuclei, and with particular reference to silver iodide he observes that, despite its very weak solubility, there is a critical dimension of the nuclei below which they are ineffectual, owing to the fact that they dissolve when introduced into clouds at positive or weakly negative temperatures. As a result, contrary to the techniques used up till now, it is not advisable to try to obtain dispersion with a high output, since the number of nuclei measured in the laboratory or in the cold chamber, does not represent the effectiveness of the nuclei introduced, for instance, from the ground into a cloud of positive temperature. For seeding techniques, a dimensional optimum should be respected, taking into consideration both solubility and the photochemical, or purely chemical de-activation. *Subject Headings:* **1. Freezing nuclei 2. Cloud seeding with silver iodide 3. Cloud seeding techniques 4. Silver iodide properties.**—*Author's summary.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

COMPOSITION AND DENSITY OF THE ATMOSPHERE

See: **Falling sphere soundings for upper air density** (Jones, Bartman), 10.7-39; **Earth's atmos.** (Löbsack), 10.7-54; **Air density and satellite obs.** (Paetzold, Zschörner), 10.7-97.

ATMOSPHERIC POLLUTION

See also: **Smog disasters,** 10.7-41; **Radioactive carbon produced by atomic explosions** (Münnich, Vogel), 10.7-191; **Meteoric dust erosion of satellites** (Hoenig), 10.7-96; **Inversion effects on atmos. pollution, Gt. Britain** (Spurr), 10.7-228; **Sodium chloride nuclei** (Robbins et al.), 10.7-257; **Atmos. pollution effects on fog formation, India** Mukherjee), 10.7-259; **Carbon dioxide and climatic change** (Revelle), 10.7-278; **Atmos. electricity disturbances by smoke, Asama-yama Volcano, Japan** (Hatakeyama), 10.7-298.

10.7-181 551.510.42:551.557.2(794)

Holzworth, George C. (*U. S. W. B.*), **Atmospheric contaminants at remote California coastal sites.** *Journal of Meteorology*, Boston, 16(1):68-79, Feb. **1959.** 3 figs., 12 tables, 21 refs. **DWB, DLC** —The chemical analyses of particulate samples obtained by high-volume air sampling instruments at remote sites near the California coast are shown to be related to trajectories of the sampled air. In particular, high chloride concentrations are associated with nearby heavy surf conditions. Background concentrations of materials analyzed are shown to agree reasonably well among the various sites. Measurements of oxidant concentrations at rural sites are given and compared with previously observed background concentrations. The occurrence of relatively high oxidant concentrations at a site 70 mi from the nearest most-likely source area is discussed with respect to trajectory computations. *Subject Headings:* **1. Atmospheric pollution trajectory studies 2. California.**—*Author's abstract.*

10.7-182 551.510.42(545.8)

Lackhanpal, R. N. and Nair, P. K. K., (*both, Birbal Sahni Inst. of Palaeobotany, Lucknow*), **Survey of the atmospheric pollen at Lucknow.** *Journal of Scientific and Industrial Research, Sec. C*, Delhi, 17(5):80-87, May **1958.** 2 figs., plate, 2 tables, 5 refs. **DLC**—A preliminary survey of the atmospheric pollen at Lucknow was carried out over a period of one year, commencing in Oct. 1954. The pollen were caught daily on a microscope slide smeared with glycerine jelly and exposed to the atmosphere at a height of about 25 ft above the ground level. The pollen content of the atmosphere was found to be maximum during Feb. to April, minimum during July and Aug., and moderate during Oct. to Jan. The most abundant pollen type present was that of *Holoptelea*. Other frequent types were those of *Ailanthus*, *Morus* and *Azardirachta*, and *Gramineae*, *Amaranthaceae-Chenopodiaceae*, *Leguminosae* and *Myrtaceae*. There are indications of some pollen being flown in from the Himalayas over a distance of more than 200 mi. *Subject Headings:* **1. Pollen counts 2. Lucknow, India.**—*Authors' abstract.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Meteor physics texts.** (Öpik), 10.7-5; **Tropopause anal. and forecast.** (Stinson), 10.7-36; **Troposphere-ionosphere relationships** (Bauer), 10.7-185; **F_2 layer ionization variations** (Bhargava), 10.7-297.

10.7-183 551.510.5

Millman, Peter M., **Upper atmosphere and current research.** *Royal Astronomical Society of Canada, Journal*, 51(6):334-340, Dec. **1957.** 2 figs. **DLC**—A review of research on the upper atmosphere reported at the Boulder, Colo., assembly of the U.R.S.I. (XII) and the Toronto Assembly of the I.U.G.G. (XI), in August and Sept. 1957, respectively. Subjects of particular interest dwelled on are 1) Whistlers, 2) Ozone, 3) Airglow, 4) Auroral temperatures, 5) Auroral cameras, 6) Fine structure of the ionosphere, 7) Ionospheric winds 8) Meteor ionization, 9) Meteor velocities. *Subject Headings:* **1. Upper atmosphere research 2. Ionospheric research 3. Auroral research 4. Whistler research.**—*M. R.*

10.7–184 551.510.52/3

†Byers, Horace R. (*Dept. Met., Univ. of Chic.*), **The atmosphere up to 30 kilometers.** (In: Kuiper, Gerard P. (*ed.*), **The earth as a planet.** Chicago, Univ. of Chic. Press, **1954.** p. 299–370. 32 figs. (incl. photos), 5 tables, bibliog. p. 367–370). **DLC** (QB501.K75)—The atmosphere below the stratopause (i.e. the troposphere and stratosphere) is discussed in 7 separate sections: 1) composition and heat or radiation balance; 2) temp. distribution (vertical and a periodic); 3) atmos. circulation (general circulation, dishpan models, the jet stream, meridional and zonal flow, the Palmén model, etc.); 4) secondary circulations (upper waves, cyclones, convergence zones); 5) tropical cyclones and tropical weather (minor tropical storms, hurricanes and typhoons, the "eye," precip. bands, radar photos, etc.); 6) atmospheric electricity; 7) condensation and precip. (*Same item as* 7I–146, Sept. 1956, *MAB.*) *Subject Heading:* **1. Atmospheric structure.**—*M.R.*

10.7–185 551.510.52:551.510.535:551.542:551.594 1?

Bauer, S. J. (*U. S. Army Signal Res. and Develop. Lab., Fort Monmouth, N. J.*), **Correlations between tropospheric and ionospheric parameters.** *Geofisica Pura e Applicata.* Milan, 40:235–240, **1958.** fig., table, 14 refs. **DWB.** Also: Hackewitz, Helga v. (*Met. Inst. Universität Köln*), **Zur Frage ionosphärisch-troposphärischer Beziehungen.** [Problem of ionospheric-tropospheric relationships.] *Ibid.*, 40:241–246, **1958.** 6 figs., 9 refs. German and English summaries p. 241. **DWB**—The first article (by Bauer) discusses the general aspects of troposphere-ionosphere relationships and a suggested mechanism of a possible coupling between lower and upper atmosphere. The presentation includes results of a correlation analysis of surface pressure and electron density of the ionospheric F2 layer for Washington, D. C., covering a time interval of 23 months. The correlation is significant for only three months and the sign of the correlation is not consistent. The three significant correlations between surface pressure and F2 electron density occur at times of an "index cycle," i.e., the periodic fluctuations in the zonal circulation of the atmosphere and for a month of heavy hurricane activity. The review of correlations obtained by other authors also indicates that their significant correlations occur at times when intensive changes in the tropospheric circulation occur, especially in winter and spring (the time favored by index cycles) and at the beginning and retreat of the summer monsoon in India. The variable sign of correlation between surface pressure and ionospheric characteristics is considered to be the result of the ambiguity of surface pressure as an indicator for dynamic changes in the lower atmosphere which may possibly initiate certain changes in the upper atmosphere. It is speculated that the observed correlations are the effect of upward propagation of strong disturbances from the troposphere to the ionosphere. At the present time, however, no definite conclusion can be drawn as to the reality of the suggested troposphere-ionosphere relationships. Aroused by Bauer's paper, the author of the second article (Hackewitz) tried to find a correlation between foF2 or h'F2 and cold front passages for a year with a small, respectively big number of sunspots. Contrary to Bauer, no correlation was found. Furthermore, a connection between atmospheric pressure at the ground and ionospheric storms was undertaken. The result for the winter 1953/54 with a small number of sunspots was significant. *Subject Headings:* **1. Pressure effects on ionospheric electron density 2. Troposphere-ionosphere relationships.**—*Authors' summaries.*

10.7–186 551.510.52:551.513.2:551.557

§Defant, Friedrich (*Univ. of Innsbruck, Austria*) and Taba, Hessam (*Internat. Met. Inst., Stockholm*), **The break down of zonal circulation during the period Jan. 8–13, 1956, the characteristics of temperature field and tropopause and its relation to the atmospheric field of motion.** *Tellus*, Stockholm, 10(4):430–450, Nov. **1958.** 10 figs., table, 5 refs. **DLC**—An introductory outline of earlier work (Defant and Taba, 1957, 1958, 1958; (*see* 9.8–150, Aug. 1958 and 10.3–23, March 1959, *MAB*)) on hemispheric changes in the type of general circulation by means of tropopause maps is presented to make the reader familiar with the main features of tropopause and its intimate relation to the main windcores of the westerlies. The prehistory of the period from Jan. 8 to 13, 1956, which we studied in this paper, is described in detail. Tropopause maps for each day (Jan. 8 to 13, 1956) are presented. By means of these maps it was shown how the zonal type circulation (zonal with respect to a zonal polarfront jet) changes

during this period from a meridional (westerly) type. The behavior of subtropical jet in a characteristic way different from that of polarfront jet is simultaneously discussed. A collection of soundings with respect to the occurrence of the tropopause level or according to the occurrence of the belts of maximum wind of the westerlies was made for each day. Different characteristic groups of soundings (winter) with respect to the total vertical temperature distribution and the form as well as the height of tropopause are discussed and characteristic mean soundings for each group are computed. A computation of standard deviation of the individual vertical temperature distributions from the mean one for each group is presented. The important conservation of the sounding type in each group is shown. Meridional temperature differences between different groups inform the reader about the possible locations of baroclinity in tropo- and stratosphere. A statistical investigation of tropopause level by use of 2514 atmospheric soundings from Jan. 1 to 12, 1956 is presented. The structure of tropopause is discussed. A synoptic vertical cross section clarifies the relationship between subtropical break in the tropopause level and the existence of the subtropical jet. Important aspects of form of subtropical jet are outlined. *Subject Headings:* 1. Tropopause chart analysis 2. Tropopause-jet stream relationship 3. Zonal circulation tropopause relationships.—*Author's abstract.*

10.7–187 551.510.535 551.501.81:523.3

Burkard O. *Inst. für Met. und Geophysik der Univ. Graz.* **Studien zum neuen Modell der Ionosphäre: I.** [Studies on the new ionospheric model. Pt. 1.] *Geofisica Pura e Applicata.* Milan. 41:133–140. 1958. 3 figs., table, 6 refs., 12 eqs. German and English summaries. 133. DLC. Electron content of the atmosphere has been determined from recent experiments with ultrashort waves reflected by the moon. This data may make it possible to examine the model of the ionosphere stated by Bukkard. The variation with height of the electron-density is calculated for three selected cases and good agreement is shown between model and experimental observations. The temperature of the upper atmosphere is supposed to come partly from absorbed solar radiation and partly from outward thermal conduction from the solar corona after Chapman. *Subject Headings:* 1. Ionospheric models 2. Radar echoes from moon.—*Author's summary.*

10.7–188 551.510.535

Ferraro, V. C. A. *Queen Mary College, Univ. of London.* **The coefficient of diffusion of ions in the F2- regions.** *Journal of Atmospheric and Terrestrial Physics.* London. 11:3/4:296–298. 1957. 2 refs., 7 eqs. DLC. New values for the coefficient of diffusion D_{12} in the ionosphere are given for various temps. $nD_{12}\times10^{-15}$

300°	400°	500°	700°	1000°
2.61	3.48	4.34	6.1	8.69

These are nearly double those using Langevin's formula at low temps. and about the same for *F* layer temps. Taking the masses of ions and atoms to be the mass of an oxygen atom:

$$D_{12}=\frac{7.24\times10^{17}}{n}T^{\frac{1}{2}}, \text{ so far}$$

$T=400°$ $\quad nD_{12}=1.47\times10^{15}$ and for

$T=600°$ $\quad nD_{12}=2.17\times10^{15}$

three times the values computed from Langevin's formula. *Subject Headings:* 1. Diffusion coefficient 2. *F* layer diffusion.—*M.R.*

10.7–189 551.510.535:621.8

Holt, Olav and Landmark, Bjorn. *Both, Norwegian Defence Res. Establishment, Kjeller.* **The statistical properties of the signal fine structure in ionospheric scatter propagation.** *Teknisk Ukeblad.* Oslo. 20 p. March 1958. 7 p. 7 figs., 7 refs., eqs. DLC, DWB.—The statistical properties of the signal fine structure for a VHF ionospheric scatter circuit between northern and southern Norway have been examined. It is shown that the back-wave component of the signal has statistical properties in agreement with those to be ex-

pected for Gaussian noise, and that this signal therefore can be explained in terms of scattering from a large number of irregularities. The fading of the enduring meteoric bursts, on the other hand, must be explained in terms of interference between a few reflected components resulting from bending of the trail due to large scale wind gradients. *Subject Heading:* **1. Ionospheric scatter propagation.**—*Authors' abstract.*

10.7–190 551.510.535:523.746

Rastogi, R. G. (*Physical Res. Lab., Ahmedabad, India*), **A study of the noon critical frequencies of the *E* and *F1* layers of the ionosphere.** *Geofisica Pura e Applicata*, Milan, 40:145–156, **1958.** 15 figs., table, refs. **DWB**—The mean monthly noon critical frequencies of the *E* and *F1* layers of the ionosphere at a number of stations in different latitudes and their variation with sunspot number have been studied. It was found that while the *E* layer approximates a Chapman region, the *F1* layer is markedly affected by other agencies, somewhat similar to *F2*. In high sunspot years, f_0F1 shows two maxima at middle latitudes with a minimum at the equator. *Subject Headings:* **1. E layer critical frequencies 2. F_1 layer critical frequencies 3. Sunspot effects on ionosphere.**—*Author's summary.*

RADIOACTIVITY

10.7–191 551.510.7:551.510.42:541.126

Münnich, K. O. and Vogel, J. C. (*both, Heidelberg*), **Durch Atomexplosionen erzeugter Radiokohlenstoff in der Atmosphäre.** [Radioactive carbon produced in the atmosphere by atomic explosions.] *Die Naturwissenschaften*, Berlin, 45(14):327–329, July **1958.** 2 figs. table, 9 refs. **DLC**—The fact that experimental bases for atomic bombs are situated N of the equator, an increase of radioactivity is to be expected in the Northern Hemisphere. The authors comment in detail on the measurements made in New Zealand by RAFTER and FERGUSSON on the sea surface and on plants. Graphs give the deviation in % of the amount of C_1 of plants in Central Europe and in South Africa. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Artificial radioactivity 3. Atomic explosions.**—*A. V.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Nongeostrophic models of atmos. flow** (Edelmann), 10.7–27; **Lee waves** (Zierep), 10.7–108; **Vorticity computations** (Grundy), 10.7–131; **Numerical models including topographic effects** (Sawyer), 10.7–168.

10.7–192 551.511:551.513:551.55

Hesselberg, Th., **Some transports in the atmosphere.** *Meteorologiske Annaler*, Oslo 4(10):203–213, **1958.** 3 tables, 10 eqs. **DLC**—In this paper the mean movements for selected months and the deviations from these means, generally called the eddy movements, are computed and also transports of different meteorological quantities (mass, specific momentum, kinetic energy, heat, water vapor, etc.) with mean winds and with eddy movements. *Subject Headings:* **1. Eddy motion 2. Atmospheric circulation.**—*Author's abstract.*

10.7–193 551.511.3

Gruza, G. V., **O termicheskom ravnovesii v atmosfere.** [Thermal equilibrium in the atmosphere.] *Akademiia Nauk SSSR. Izvestiia, Ser. Geofiz.*, No. 4:564–565, April **1958.** 7 refs., 5 eqs. **DLC**—The atmosphere is considered at thermal equilibrium when the vertical turbulent flow of heat is zero:

$$q = \rho c_p \overline{w'T'} = \rho c_p r \sigma_w' \sigma_T'$$

where ρ—density, c_p—heat capacity at constant pressure, $w'T'$—pulsations of vertical velocity and temperature, $\sigma_w' \sigma_T'$—mean square values of vertical velocity and temperature, r—coefficient of correlation between w' and T'). At $q=0$ potential temperature is constant. In the derivation of heat exchange formulas, it is assumed that turbulent eddies transport the mean potential temperature of the level of their origin. It is shown that, at thermal equilibrium, deductions based upon assumed transport of mean potential temperature retain their validity also when

the pulsations of temperature are taken into account, and the condition of constant potential temperature is confirmed. The conclusion of BUDYKO and IUDIN (*Akad. Nauk SSSR, Doklady*, 53(7), 1946) that thermal equilibrium occurs with an increase in potential temperature with elevation is analyzed. *Subject Headings:* **1. Heat balance of atmosphere 2. Potential temperature.**—*I.L.D.*

10.7–194 551.511.6

Barad, Morton L. and Haugen, Duane A. (*both, GRD, A.F. Camb. Res. Center, Mass.*), **A preliminary evaluation of Sutton's hypothesis for diffusion from a continuous point source.** *Journal of Meteorology*, Boston, 16(1):12–20, Feb. **1959.** 7 figs., table, 2 refs., 10 eqs. **DWB, DLC**—Sutton's hypothesis for diffusion from a continuous point source has been evaluated, using the data obtained during "Project Prairie Grass." It is found that the hypothesis predicts the observed concentration distributions only if there are two values of SUTTON's "n," one to characterize lateral diffusion (n_y) and one to characterize vertical diffusion (n_z). Statistical tests indicate that n_y and n_z are invariant with distance between 100 and 800 m of the source, but that the values of n_y and n_z, appropriate for these distances, exceed the values within 100 m of the source. It is also shown that neither n_y nor n_z can be specified by n_w, the value of n found from a power-law fit to the wind profile in the lowest 8 m. *Subject Headings:* **1. Diffusion theories 2. Sutton's hypothesis.**—*Authors' abstract.*

10.7–195 551.511.6:532.72

Godson, W. L. (*Meteorological Branch, Toronto*), **The diffusion of particulate matter from an elevated source.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):305–327, **1958.** 8 figs., table, 11 refs., 46 eqs. German and French summaries p. 305–306. **DWB, DLC**—The problem of the diffusion of particulate matter from an elevated source is important to industry, to agriculture and to public health. On the experimental and theoretical side, simple ground measurements of this phenomenon offer very sensitive tests of diffusion theories. A theoretical solution to this problem, using the K-theory formulation by DEACON (*see* 4B–177, Feb. 1953, *MAB*), but valid only for neutral stability, was given by ROUNDS (*see* 7.4–139, April 1956, *MAB*) in 1955 and has been extended by approximate methods to cover any stability for the present author. Calculations then show the dependence of down-wind distribution of deposited matter on stability, surface roughness, height of source, wind speed and particle size. The effects on the location and magnitude of maximum deposition produced by simultaneous variations in two or more of the above parameters are also portrayed. The formulation by SUTTON (1943) of the statistical theory (the C-theory) has been applied to particulate diffusion by numerous authors, who give differing solutions largely as a result of inconsistent boundary assumptions. A formally correct solution is derived, but a fundamental reexamination of the turbulence mechanism described by the C-theory reveals that this theory is probably not applicable to diffusion from an elevated source near the ground (although it may give essentially the correct ground concentration for gaseous aerosols). In addition, the K-theory has a decided advantage for practical application in that all the parameters required are inherent in the vertical profile of wind speed. *Subject Headings:* **1. Diffusion measurement techniques 2. Diffusion theories.**—*Author's summary.*

10.7–196 551.511.6:551.509.311

Keitz, Edwin L. (*New York Univ.*), **Differential advection as a factor in clear-air turbulence.** *Journal of Meteorology*, Boston, 16(1):57–62, Feb. **1959.** 2 figs., 5 tables, 14 refs., 4 eqs. **DWB, DLC**—Clear-air turbulence observations made by accelerometer measurements have been correlated with 6-hr forecasts of the change in vertical stability. The change in stability has been forecast by computing the 6-hr horizontal temperature advection at two levels. By means of the KOLMOGOROV-SMIRNOV nonparametric test for cumulative distributions, a significant correlation has been shown to exist between the observations of turbulence and the forecast change in stability. However, no significance has been established regarding the magnitude of the turbulence. (Abstracted from another source as 8.10–105, Oct. 1957, *MAB*.) *Subject Headings:* **1. Differential advection 2. Clear air turbulence 3. Stability change forecasting.**—*Author's abstract.*

GENERAL CIRCULATION

See also: **Azores low** (Groening), 10.7–28; **Arctic anticyclone circulation** (Keegan), 10.7–59; **Jet stream flying, N. Atlantic** (Reynolds, Chandler), 10.7–104; **Jet stream forecast.** (Kaufmann), 10.7–174; **Tropopause chart analysis** (Defant), 10.7–186; **Eddy motion** (Hesselberg), 10.7–192; **Severe winters** (Kats, Tiurina), 10.7–226.

10.7–197 551.513:551.515

Lamb, H. H. (*Met. Office, Harrow*), **The southern westerlies: a preliminary survey: main characteristics and apparent associations.** *Royal Meteorological Society, Quarterly Journal,* 85(363):1–23, Jan. **1959.** 14 figs., table, bibliog. p. 22–23. **DWB, DLC**—Provisional figures can now be given for the ratio of momentum in the southern circumpolar westerlies to the momentum of the better-known northern system. This ratio appears to be 1.5 or rather more, over the year as a whole, and rises to over 4 in the northern summer-southern winter. The preponderance of the southern system is such that it may be regarded as the "flywheel" of the general atmospheric circulation and there are indications that changes in the southern westerlies entail world-wide adjustments. Preliminary survey at the 500 mb level shows the main trough south of 40°S centered about 100°–110°E at most seasons of the year and the principal ridge in the neighborhood of the outer reaches of the Ross Sea. The mean troughs and ridges have notably smaller amplitude than in the Northern Hemisphere. Control of trough and ridge positions appears to be thermal rather than orographic, associated with the position of the broadest part of the Antarctic cooling surface. Little seasonal movement of the troughs and ridges in longitude is discerned and no very great change of circulation intensity, but there is an intensification of flow and increase of amplitude in the Indian Ocean trough from summer to late winter. The pattern of glaciation, as well as available data on depression tracks and anticyclone distribution over the Southern Ocean, support the pattern of ridges and troughs at 500 mb here described and throw light upon the occurrence of blocking in various sectors of the Southern Hemisphere. This study suggests that it may be the momentum and energy of the southern westerlies which are ultimately responsible for maintaining the meteorological equator on average north of the geographical equator, at least over the oceans. In any climatic epoch when the southern westerlies were farther south than now, and/or weaker than now, the meteorological equator should under this proposition have been nearer the true equator than is now the case. The work of other investigators has suggested that the equatorial low pressure belt should also be wider at times when the circumpolar westerlies weaken in either hemisphere. The changes here postulated appear to fit in with what is known of conditions around, and since, the culminating phase of the "Little Ice Age" in the Northern Hemisphere about a century and a half ago. *Subject Headings:* **1. Southern Hemisphere circulation 2. Planetary circulation.**—*Author's summary.*

10.7–198 551.513.1(51

Academia Sinica, Peking. Institute of Geophysics and Meteorology, **On the general circulation over Eastern Asia, Pt. 3.** *Tellus,* Stockholm, 10(3):299–312, Aug. **1958.** 16 figs., 5 refs., 31 eqs. **DLC**—The averaged vertical motion and the heat sources and sinks have been computed for the normal maps for Jan. and July. The perturbations in the westerlies, due to large-scale heat sources and sinks and to the earth's topography, are discussed, first using the theory of small perturbations and, secondly, allowing the perturbations to be of a finite amplitude. Sec. 2 contains a discussion of the dynamic influence of topography on the daily weather systems. (For abstract on Pts. 1 and 2, *see* 10.5–228, May 1959, *MAB.*) *Subject Headings:* **1. General circulation 2. Eastern Asia.**—*Author's abstract.*

10.7–199 551.513.1:551.557.2:551.558.2

Ball, F. K. (*Commonwealth Sci. & Indus. Res. Org., Melbourne*), **Long waves, lee waves and gravity waves.** *Royal Meteorological Society, Quarterly Journal,* 85(363):24–30, Jan. **1959.** 3 figs., 9 refs., 17 eqs. **DWB, DLC**—It is shown that the equation determining the streamlines of large-scale atmospheric motions (jet streams and long waves) is similar to the equation determining the streamlines of small-scale gravitational motions of a stratified liquid. Both motions are characterized by the occurrence of jets, the number of jets being determined by the value of a dimensionless parameter. Atmospheric flow at 500 mb is compared with

theoretical solutions (derived by LONG 1955) of the nonlinear equations for the flow of a stratified liquid. Linearization of the equation for large-scale atmospheric motions leads to the ROSSBY wave equation, whereas linearization of the equation for the motion of a stratified liquid leads to SCORER's lee-wave equation. *Subject Headings:* **1. Long waves 2. Lee waves 3. Gravity waves.**—*Author's summary.*

ATMOSPHERIC DISTURBANCES

See also: **Numerical forecast. studies, Japan**, 10.7–1; **Azores low and synoptic-climat. studies** (Groening), 10.7–28; **Cold pools, Rocky Mts.-Ural sector of N. Hemisphere** (Weimann), 10.7–31; **Hurricane develop., W. North Pacific** (Ramage), 10.7–35; **Arctic anticyclone circulation** (Keegan), 10.7–59; **Wind eff. on storm tides, N. Sea** (Lauwerier), 10.7–85; **Aircraft hurricane reconnaissance** (La Seur), 10.7–133; **Radar echoes from cloudless cold fronts** (Ligda, Bigler), 10.7–139; **Cold lows, Southeastern U. S., July 1958** (Di Loreto, Hamada), 10.7–156; **Hurricane movement forecast.** (Jorgensen), 10.7–171; **S. Hemisphere circulation** (Lamb), 10.7–197.

10.7–200 551.515:551.553.8(757)

†Magor, Bernard W. (*U. S. Weather Bur., Kansas City, Mo.*), **A meso-low associated with a severe storm.** *Monthly Weather Review*, Wash., D. C., 86(3):81–90, March **1958.** 10 figs., 18 refs. Also his: **Further tests of operational mesoanalysis.** *Ibid.*, p. 116. ref. **DWB, DLC**—A meso-low was followed through a 14-hr period over a track about 600 mi in length. This low was associated with severe storms along its route and subsequently became coincident with the vortex of a well-documented severe storm at Charleston, S. C. on Jan. 18, 1955. The objective is to show that such lows can sometimes be tracked with the present observational network and to point out some of the interesting meteorological features of this type of analysis, along with forecasting implications. *Subject Headings:* **1. Severe storms 2. Mesoanalysis 3. Charleston, S. C.**—*Author's abstract.*

10.7–201 551.515.4:551.54

Innas Ali, M. and Lutfur Rahman, Md. (*both, Dacca Univ.*), **Meteorological correlation of thunderstorm intensity with depressions of barometric pressure.** *Pakistan Journal of Scientific Research*, Lahore, 8(3):106–108, July **1956.** 5 figs., 11 refs. **DLC**—A commercial superheterodyne receiver was tuned at 500 m fed by an L-type aerial. The output of the receiver was connected to a cathode-ray oscillograph provided with a recording camera. Thunderstorm field intensities were thus continuously recorded. Hourly barometric pressures and temperatures were also continuously recorded and a correlation between the depressions of barometric pressures and thunderstorm field intensities was made. *Subject Headings:* **1. Pressure-thunderstorm correlations 2. Thunderstorm field intensities.**—*Authors' abstract.*

10.7–202 551.515.1:551.515.7(98)

Keegan, Thomas J. (*GRD, AF Camb. Res. Center*), **Arctic synoptic activity in winter.** *Journal of Meteorology*, Boston, 15(6):513–521, Dec. **1958.** 5 figs., 2 tables, 6 refs. **DWB, DLC**—The wintertime distribution, structure and motion of cyclones and anticyclones in the Arctic are analyzed through the use of 15 winter months of data. Histories of the most important types of pressure systems are described, and note is made of the interaction between the Arctic and middle latitudes. The effect of the receipt of weather reports from the central Arctic on previous concepts of the circulation is discussed. This study shows that the Arctic is a region of great synoptic activity with cyclones outnumbering anticyclones about 2 to 1. The central Arctic Basin is a region of cyclonic frequency equivalent to any place in the Northern Hemisphere outside of the semipermanent centers of action. In the mean, cyclones are warm in the troposphere because most of them enter the Arctic from over the warm waters of the Atlantic Ocean. Cyclones which originate in the Arctic are cold-core. Anticyclones, in the mean, are colder than cyclones. However, their centers are usually capped by slightly warmer air, from the oceanic ridges, than is present over their peripheries. *Subject Headings:* **1. Polar cyclones 2. Arctic air circulation 3. Arctic.**—*Author's abstract.*

10.7–203 551.515.1:551.515.81:551.553.8

†Tepper, M., **Squall lines, pressure jump lines and atmospheric gravity waves.** *Schweizer Aero-Revue*, Berne, 33(1):37–45, **1958.** 10 figs., 12 refs. **DLC**—The author gives a survey regarding the nature of squall lines, and their identification as pressure jump lines. He outlines a theory of intensification of gravity waves. The analysis of several synoptic situations, which led to heavy storms, demonstrates the dynamical formation of gravity waves. *Subject Headings:* **1. Extratropical cyclones 2. Squall lines 3. Gravity waves.**—*A. V.*

10.7–204 551.515.2:551.553.8

Blumen, William and LaSeur, Noel E., **Some details of the wind field in individual hurricanes.** Florida. State Univ. Dept. of Meteorology, Contract AF 19(604)-753 and CWB-9121, Scientific Report No. 7, July 31, **1958.** 45 p. 33 figs., 6 refs., 4 eqs. **DWB** (M15.2 F636s)—During the 1955 hurricane season a research flight program was undertaken in which wind observations were recorded at intervals of 1–2 mi in various hurricanes. These observations permitted, for the first time, more detailed analyses of the hurricane field of motion, including some "meso-scale" features along portions of the flight track. This report presents such analyses, which include: the total velocity field; radial and tangential components; divergence and relative vorticity. Operational limitations with one aircraft have restricted these analyses to a different level in each of three hurricanes, in various stages of development. Nevertheless certain features, such as the order of magnitude of divergence and vorticity and their distributions, are very similar in the innermost storm region within a 1–2° radius of the center. Variations from average conditions are found in different quadrants and these might prove to be significant in understanding the more basic storm processes, such as entrainment and differential vertical motion. Regions of negative absolute vorticity are clearly established in the low and high levels, but it is carefully pointed out that this feature, as well as others are characteristic of these individual flights, and should not be generalized for all hurricanes at these levels. *Subject Headings:* **1. Wind field in hurricanes 2. Hurricane wind data.**—*Authors' abstract.*

10.7–205 551.515.21:551.574.11

†Woodcock, Alfred H. (*Woods Hole Oceanographic Inst., Mass.*), **The release of latent heat in tropical storms due to the fall-out of sea-salt particles.** *Tellus*, Stockholm, 10(3):355–371, Aug. **1958.** 9 figs., 5 tables, 40 refs., 5 eqs. **DLC**—Observations of atmospheric sea salt in a hurricane are used to estimate the weight of salt in the clear air at cloud levels. These quantities are then used to determine the rate of release of heat in the moist air layers below, due to condensation on this salt as it falls from the relatively dry air at higher levels. This rate is found adequate to alter significantly the distribution of heat and water vapor in the cloud-layer air and to explain much of the observed potential temperature increase in the lower air converging upon the central regions of hurricanes. *Subject Headings:* **1. Hurricane structure 2. Nuclei effects on hurricanes.**—*Author's abstract.*

10.7–206 551.515.81:551.553.8(522)

Kohara, N., **Surface analysis of warm type gustwindstorm in the period of the second gustwindstorm project.** *Journal of Meteorological Research*, Tokyo, 10(8):638–647, Aug **1958.** 38 figs., 2 refs. In Japanese; English summary p. 638. **DLC**—The second cooperative study of the gustwindstorm was undertaken from Jan. 21, to Feb. 20, 1957 by the Fukuoka District Meteorological Observatory, the Nagasaki Marine Observatory and the Seventh Regional Marine Safety Headquarters. Six gustwindstorms were observed in the period among which two were the warm type. These warm type gustwindstorms were analyzed in detail using data from ships including those of the seventh Regional Marine Safety Headquarters and weather stations. (1) Warm type gustwindstorm on Jan. 26 to 27, 1957: a) The warm type gustwindstorm was strong, while the cold type one was not so strong; b) The period of strong wind coincided with that of high temperature; c) Thus, this gustwindstorm was thought of as a strong northward flow of fresh warm air; d) Instability line differs from the typical one accompanied with a severe strong gustwindstorm observed on Jan. 30, 1955. (2) Warm type gustwindstorm on Jan. 29, 1957: a) This was not so strong as the former gustwindstorm and restricted to southern Kyūshū; b) Instability line appeared again, but did not

reach northern Kyūshū. *Subject Headings:* 1. Wind storms 2. Frontal storms 3. Japan.—*Author's abstract.*

10.7–207 551.515.8:551.515.11(541.2)

Sen, S. N. (*Met. Office, Poona*), **Influence of upper level troughs and ridges on the formation of post-monsoon cyclones in the Bay of Bengal.** *Indian Journal of Meteorology and Geophysics, New Delhi*, 10(1):7–24, Jan. **1959.** 8 figs., 7 tables, 14 refs. **DWB, DLC**—The upper air conditions at the formative stages of several depressions and cyclones in the Indian seas were studied by Desai and Rao in the light of Riehl's model for the formation of tropical cyclones. The recent introduction of twice daily radiosonde-rawin ascents at some stations in India provided additional facilities for similar studies in this area. The available upper air conditions associated with the formation of two post-monsoon cyclones of 1955 in the Bay of Bengal were accordingly studied with the idea of finding how far Riehl's theory of tropical cyclones could be applied in these cases. The present study of the post-monsoon cyclones of 1955 reveals that two radiosonde ascents a day from a reasonable network of stations should be minimum requirement for studies of this kind. Time cross-sections showing 24-hr changes of heights at intervals of 12 hrs are presented to illustrate the sequence of movement of upper troughs and ridges. As postulated by Riehl, the formation of both the cyclones was apparently associated with the passage of troughs in the westerlies across northeast India, i.e., to the north of the area of cyclogenesis. But the upper air data from the available network of stations were too inadequate for drawing any definite conclusion as to whether the initial mass divergence at upper level was caused by the southward extension of the westerly trough and the superposition of its forward portion over the surface incipient low, or by the in-phase superposition of the upper trough in the westerlies with the upper tropospheric vortices moving across the Bay of Bengal. Dynamical development to the south of a confluent trough in the westerlies is suggested as a possible contributory factor for the cyclogenesis in the south Bay of Bengal. The influence of the middle-latitude trough on the recurvature of one of the cyclones while out at sea and of another similar cyclone of Oct. 1949 which had recurved only after crossing the coast, and the unexpected weakening of the former while out at sea, have been discussed. *Subject Headings:* **1. Upper level trough effects on cyclogenesis 2. Post-monsoon cyclone formation 3. Cyclogenesis 4. Bay of Bengal, India.**—*Author's abstract.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Solar infrared spectra atlases** (Migeotte et al.), 10.7–46; **Water supply and potato yield** (Scholte), 10.7–111; **Solar collectors** (Hottel), 10.7–122; **Solar collectors** (Gier, Dunkle), 10.7–123; **Solar heating** (Buchberg), 10.7–124; **Infrared radiation eff. on man** (Knepple), 10.7–128; **Condensation nuclei formation** (Knof), 10.7–150.

10.7–208 551.521.1(68)

*†Drummond, A. J. (*Eppley Laboratory, Newport, R. I.*), **Radiation and the thermal balance.** *UNESCO Arid Zone Research*, No. 10:56–74, **1958.** 2 figs., 16 tables, 77 refs. **DWB, DLC**—Recent studies on radiation, especially those of the last 5 or 6 yrs, are summarized for the purpose of providing a background summary for the UNESCO—Australia Symposium on Arid Climatology. The contents of this study cover the following: the characteristics of the sun's radiation, including its variability, the solar constant, etc.; spectral distribution of sunlight outside the atmosphere and at the surface of the earth; the extra-terrestrial flux of solar energy; the reflection and absorption of solar radiation within the atmosphere; surface radiation income at the surface of the earth; natural illumination, including the luminous efficiency of daylight, and illumination due to direct sunlight and skylight; the difficulties involved in the study of long wave radiation in the atmosphere; incoming atmospheric radiation and the use of radiation charts to compute radiation flux in the atmosphere; divergence of the flux of terrestrial radiation upon which the temperature change due to radiation depends, and the study of long wave radiation by energy budget studies. In addition to numerical data on solar radiation within

specified spectral intensities, short wave radiation income at the earth's surface for various regions, etc., the author presents recent data on the summer and winter distribution of the total radiation intensity in South Africa. Data on the distribution of total radiation on a continental basis are presented in an appendix. *Subject Headings:* **1. Radiation research 2. Radiation intensities 3. Radiation data 4. South Africa.**—*I.L.D.*

10.7–209 551.521.1:697(435.15)

†Gräfe, Kurt, **Strahlungsempfang vertikaler, ebener Flächen; Globalstrahlung von Hamburg.** [Radiation received by vertical plane surfaces: global radiation at Hamburg.] *Germany. Deutscher Wetterdienst, Berichte*, 5(29), **1956.** 15 p. 13 figs. (incl. photos), 4 tables, 28 refs. **DWB, DLC**—Comparisons of daily totals of solar plus sky plus reflected radiation from the earth's surface obtained by means of a Gorczyński solarimeter and gravity type pen recorder made for vertical surfaces oriented towards four cardinal points of the sky, for surfaces inclined southwards and angles less than 45° and for horizontal surfaces. Surfaces with an insolation area corresponding to that of KAEMPFERT and MORGEN, show the rather large proportion of sky and reflected radiation in the total radiation received. This is also confirmed by means of mean values. The ratios of the daily totals of radiation received by these surfaces to the horizontal surface clarify, on the one hand, the differential radiation received by the surfaces, and on the other hand, their mean values offer the possibility of calculating the radiation received by surfaces from the global radiation. Six year decadal and monthly means and a frequency distribution of global radiation in Hamburg are used. The data are presented by means of graphs and tables. *Subject Headings:* **1. Radiation on vertical surfaces 2. Global radiation 3. Hamburg, Germany.**—*I.L.D.*

10.7–210 551.521.11:551.577:551.588.2

Conrad, Victor (*Cambridge, Mass.*), **Höhenlage und Sonnenscheindauer an Niederschlagstagen.** [Elevation and sunshine duration on days with precipitation.] *Wetter und Leben*, Vienna, 9(1 2):1–4, **1957.** fig., 3 tables, 3 refs. **DLC**—The author investigates the variation of sunshine duration on days with precipitation during summer and winter. An empirical equation relating reduced sunshine duration in winter and summer $(S_R)_{Su}$: $(S_R)_W$ to altitude is derived; namely, $q = 4.315\ h^{-0.3151}$ where $q = (S_R)_{Su}\ (S_a)_W$ and h = height in hm. At lower elevations the sunshine duration declines on precipitation days and is three times (but at higher elevations only 1.75 times, and at Sonnblick <1.5 times) as large in summer as in winter. The physical meteorological processes associated with this phenomenon are discussed. *Subject Headings:* **1. Sunshine duration—precipitation relationships 2. Altitude effects on sunshine duration.**—*I.L.D.*

10.7–211 551.521.14:551.588.3:551.579.5

Andronikov, V. L., **O spektral'noĭ otrazhatel'noĭ sposobnosti nekotorykh pochv lesostepi** [Spectral reflectivity of some soils in forest steppes.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 3:93–97, **1958.** 3 figs., 2 tables, 5 refs. **DWB**—The methods of a detailed study of the spectral reflectivity of soils, carried out with a general purpose photometer of the FM type are described and the results commented on. It has been found that soils containing less moisture and humus appear brighter on the photo than podzolized soils with greater percentage of moisture and humus. Podzolized black earth "chernozen" photos are peculiar by a very low brightness coefficient, gray forest soils are represented by a gray color of varying intensity depending on the amount of humus and moisture, extent of podzolization and the mechanical composition of soils. *Subject Headings:* **1. Spectral reflectivity of soils 2. Soil moisture effects on albedo.**—*A.M.P.*

10.7–212 551.521.

†Curcio, J. A. and Knestrick, G. L. (*both, Optics Div. U. S. N. R. Lab., Wash., D. C.*) **Correlation of atmospheric transmission with backscattering.** *Optical Society of America Journal*, 48(10):686–689, Oct. **1958.** 6 figs., 4 refs., eqs. **DLC.** Also issued as: *U. S. Naval Research Laboratory, NRL Report* 5143, June 11, **1958.** 19 p. 20 figs., 15 refs., eqs. **DWB** (M(055) U586r)—This is a report of experimental work performed during the period of Sept. 1956 to June 1957 on the correlation of backscattering with atmospheric transmission. Meas-

urements were made for a variety of conditions where the meteorological range varied from less than 0.10 mi to more than 40 mi in atmospheres which were free of industrial pollution. Analysis of the data shows the following relationship:

$$V = C\,S^{1.5},$$

where V = meteorological range, C = constant, and S = backscattered signal. The point spread about the curve indicates that meteorological range can be determined from the backscattered signal with an accuracy of 20% for all visibilities in the ranges studied. *Subject Headings:* **1. Atmospheric transmission—backscattering correlations 2. Atmospheric transmission.**—*Authors' abstract.*

10.7–213 551.521.326

†Dalgarno, A. (*Geophysics Research Directorate, ARDC, Bedford, Mass.*), **The altitudes and excitation mechanisms of the night airglow.** *Annales de Géophysique*, Paris, 14(3):241–252, July/Sept. **1958.** 99 refs., 24 eqs. **DLC**—A review is given of the present position regarding the altitudes and excitation mechanisms of night airglow. The author examines successively the oxygen green line, the oxygen red line, the NaD lines, the OH rotation-vibration bands, the molecular bands of O_2, the airglow continuum and other airglow emissions. It may be noted that if the proposed excitation mechanisms are correct, the diurnal and seasonal variations of the atmospheric system, the Herzberg system, the green line and possibly the airglow continuum should be very similar, which seems to be the case while none of the other emissions should be closely correlated with any of this group, as again seems to be the case though the data are as yet very limited. No close correlation of the red line with any emission would be expected, and those that have been reported with NaD are probably due to contamination of the red line by OH which frequently exhibits a striking correlation with NaD during the course of the night. This correlation is of particular interest since the mechanism of exciting the NaD line is still not established; it suggests that atomic hydrogen plays a significant role in the production of the NaD emission. *Subject Headings:* **1. Night airglow 2. Night airglow spectrum 3. Night airglow continuum.**—*A. V.*

TEMPERATURE

See also: **Min. temps., Antarctica** (Shliakhov), 10.7–63; **Frost protection** (Perraudin), 10.7–112; **Frost protection** (Lemaître), 10.7–113; **Frost prevention** (Goruchon), 10.7–114; **Frost protection** (Schnelle), 10.7–116; **Spring frosts** (Krick), 10.7–172; **Frost forecast. for fruit growers, Japan** (Kuribayashi), 10.7–173; **Isotropic turbulence** (Ogura), 10.7–241; **Frost damage surveys, Germany** (Yoshino), 10.7–284.

10.7–214 551.586:551.524:612.014.4

Yoshimoto, A., **On the distribution of air temperature in a workshop.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology*, 21(1):67–74, **1957.** 4 figs., 3 tables. In Japanese; English summary p. 73–74. **DLC**—In order to remodel a workshop when the working efficiency drops largely to high temperatures during the hot summer season, observations were made with a thermopile, on the distribution of temperature inside the building. The first observation was made in August and Sept., 1955. The building was partly remodeled afterwards, based upon the observation. The second observation was made 1956 under almost the same conditions as in the previous year. The purpose of the second observation was to find out if efficiency had been improved by remodeling. The summary of the observations is as follows: 1) The temperature in the upper part of the building, unventilated before remodeling, is higher than that in the lower part. After continuous ventilation through a ventilator installed on the roof, the difference in temperature is negligible. 2) On cloudy days the difference between the temperatures inside and outside the building is very little after remodeling, as well as before remodeling. 3) The temperature seems to be higher inside the building than outside when the wind is weak. This relation is independent of the remodeling. 4) On fine days, the inside temperature after remodeling is, in general, several degrees lower than that before remodeling. The rate of temperature rise after remodeling is

the order of 20 to 30% of that before remodeling. *Subject Headings:* **1. Workroom temperatures 2. Workroom comfort climate 3. Heat effects on man.**—*Author's abstract.*

10.7–215 551.524.3:551.526.6(438.4)

Tyczka, Sabina, **Charakterystyka sezonu kąpielowego nad Polskim Bałtykiem.** [Characteristics of the bathing season in the Baltic region of Poland.] *Przegląd Geofizyczny*, Warsaw, 2(4):233–242, **1957.** 5 figs., 4 tables, 6 refs. French summary p. 242. **DWB, DLC**—The results of a study of the duration of the bathing season on Poland's Baltic Sea shore, carried out simultaneously at three resorts during 1955 and 1956 at different points of the coast line, are presented and illustrated in a series of tables and graphs. These show the successive variations of sea water and air temperatures from the beginning of the bathing season (2nd half of June) to its end (about Sept. 23). 15°C is considered to be the best temperature of water and air for bathing, which should not exceed 15 min. At the beginning and towards the season's end the highest water temperatures were observed at Miedzyzdrdj and the highest air temperatures at Krynica Morska. *Subject Headings:* **1. Air-sea temperature variations 2. Bathing resorts 3. Baltic Coast, Poland.**—*A.M.P.*

10.7–216 551.524.31:551.55

Bossolasco, Mario and Dagnino, Ignazio, **Sull'escursione diurna della temperatura dell'aria lungo le coste.** [Diurnal air temperature variations along coasts.] *Geofisica e Meteorologia*, Genoa, 5(5/6):69–73, Sept./Oct. **1957.** 5 figs., 8 refs., 5 eqs. **DWB**—Citing data from Baltasound in the Shetland Is. and from Mogadiscio, the authors point out that the diurnal range of air temperatures along the coasts is around 5°C regardless of lat. In cases where marine coasts may be dominated by continental winds or where the station is located on ground protected from the winds, or at some distance from the coast, the diurnal variations of air temperature may be similar to those of the continent. For various stations along the Italian coast, the relationship between wind velocity and diurnal temperature variation is analyzed showing a decrease in air temperature variations with increasing wind velocity. Graphs showing the relationship between daily variation of temperature and wind velocity are shown for Stromboli, Gaeta, Ghiavari and Trieste, and an empirical linear relationship is established for each of these points. The relationship between diurnal temperature and wind velocity is expressed more precisely by a logarithmic relationship of the type $DT = m - n \log v$ where m and n are positive constants. Logarithmic formulas for various stations are presented. *Subject Headings:* **1. Diurnal temperature variations 2. Temperature-wind velocity relationships.**—*I.L.D.*

10.7–217 551.524.32:551.579.5

Arakawa, Hidetoshi and Tsutsumi, K. (*both, Met. Res. Inst., Tokyo*), **Integrated run-off and mean air-temperature during winter.** *Meteorological Society of Japan, Tokyo, Journal, Ser.* 2, 36(4):161–163, Aug. **1958.** 3 figs., 2 tables. **DWB, DLC**—Correlations between integrated runoff (in terms of hydro-electric potential output KWh) and mean air temperature during winter extending over a period of fifteen years are discussed for two districts in Japan. Integrated runoff during winter runs closely parallel to the mean air temperature year by year in the Tohôku District ($r = 0.83$) whose mean air temperature in winter is nearly 0°C (i.e., melting point); while no marked correlation between integrated runoff and mean air temperature during winter exists in Hokkaido, whose mean air temperature in winter is quite low as −6° to −7°C. Data for hydroelectric potential out-put shown in Tables 1 and 2 are taken from a source book published by the Ministry of International Trade and Industry, Japan. *Subject Headings:* **1. Winter temperature—runoff correlations 2. Runoff in winter 3. Japan.**—*Authors' abstract.*

10.7–218 551.524.33(439.1)

Berkes, Zoltán, **Az évszakok késése, illetve sietése éghajlatunkban.** [Late or early arrival of seasons in the climate of Hungary.] *Időjárás*, 61(5):365–366, Sept. Oct. **1957.** 2 tables, 2 refs. **DLC**—A table of absolute maxima and minima of monthly mean temperature at Budapest is presented for the last 100 yrs. The monthly extreme anomalies correspond, on the average, to the normal monthly temperature for one month earlier or later. In Jan. and

July, however, average temperature may be almost 2 months ahead or behind the season. *Subject Headings:* **1. Monthly mean temperature data 2. Temperature anomalies 3. Hungary.**—*G.T.*

10.7–219 551.524.36

Fischer, Rudolf, **Sehr milde Tage in den Wintermonaten.** [Very mild days during the winter months.] *Meteorologische Rundschau*, Berlin, 10(5):173, Sept./Oct. **1957. DWB, DLC**—Mild days in Dec., Jan. and Feb. are characterized by a minimum daily temperature of 6°C and above; normally such daily means occur towards the end of March. The incidence of such mild days in Frankfurt a.M. over the period 1900–01 to 1956–57 is analyzed. The average of such days for this period is 16, with Dec. and Feb. having 6 each and Jan. 4–5 mild days. The greatest number of mild days was 23 in Dec. 1934, 15 in Jan. 1921 and 25 in Feb. 1926. The mild winters of this period are listed. No winter was ever without at least 2–5 mild days. *Subject Headings:* **1. Mild winters 2. Frankfurt a.M., Germany.**—*I.L.D.*

10.7–220 551.524.36:551.557(54)

§Hariharan, P. S. (*Met. Off., Santacruz Airport, Bombay*), **A study of the extension of cold waves at the surface in relation to upper winds at 3000 ft. in India.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(4):363–370, Oct. **1956.** 6+ figs., 3 refs. **DWB, DLC**—A study of the relationship between the march of minimum surface temperatures in the form of cold waves over large parts of India and antecedent upper winds at 3000 ft and the extent which a particular minimum temperature isotherm is likely to advance over the surface in the next 24 hrs from its position on a particular day in northern India during winter. This investigation is based on six synoptic situations in which pronounced cold spells appeared over Western Pakistan and northwest India and moved eastwards across central India extending as far south as Deccan and Hyderabad. The isotherm of 50°F and 45°F minimum temperature generally moves with upper winds at 3000 ft. The 40°F minimum isotherm is very slow and lags very much behind upper winds at 3000 ft. The 0200 BMT upper winds can be used satisfactorily to derive positions of the isotherm on the next day. *Subject Headings:* **1. Minimum temperatures 2. Cold waves 3. Upper air winds 4. India.**—*I.L.D.*

10.7–221 551.524.36(783)

*Pengra, Ray F., **Frequencies of daily occurrence of maximum and minimum temperatures at Sioux Falls, South Dakota, each week of the year by five degree intervals together with highest and lowest temperature recorded and standard deviation of temperatures each week of the year.** *South Dakota. Agricultural Experiment Station, Agricultural Economics Pamphlet*, No. 87, July **1957. DWB** (M:63 S726a). Also: same title for **Rapid City, South Dakota.** *Ibid.*, No. 88, Aug. **1957.** Also same title for **Pierre, South Dakota.** *Ibid.*, No. 90, August **1957.** 3 pieces (14 p. each). Almost entirely tables. **DWB** (M:63 S726a)—At Sioux Falls, S. D., the record runs from 1896–1955; maximum temp. 109°F on July 5–11 and Aug. 23–29; minimum −42°F on Feb. 7–13; standard deviation of maximum 15.63°F (Jan. 24–30) and minimum 6.67°F (Aug. 9–15) and 15.71° (Jan. 31–Feb. 6). At Rapid City, the record extends from 1896–1955, during which the extreme maximum temp. was 109° (July 12–18), extreme minimum temp. was −34°F (Feb. 7–13), and standard deviation of maximum 18.4 (Jan. 31–Feb. 6) and of minimum 5.13°F (Aug. 16–22). At Pierre, period of record covers 1892–1955, numbering of weeks starts with March 1 to make all weeks uniform, but tables start with week 45 (Jan. 3–9) to approximate calendar year. Besides the frequency of maximum and of minimum temps. in each 5° interval, the highest and lowest temp. on record for that week, and standard deviation of the daily temp. are given for each week. Temps. range from 115° in week of July 19–25, to −40° in week of Jan. 31–Feb. 6 and standard deviation from 17.7 (maximum temp. in Feb. 7–13) to 5.9° (minimum Aug. 2–8). *Subject Headings:* **1. Temperature data 2. Sioux Falls, S. Dak. 3. Rapid City, S. Dak. 4. Pierre, S. Dak.**—*M.R.*

10.7–222 551.524.36:551.521.2

Szakály, József, **Hőmérsékleti minimum éjjel csupasz talaj felett.** [Minimum temperature at night over bare soil.] *Időjárás*, Budapest, 61(2):135–137, March April **1957.** 4 refs. English version p. 158–160. **DLC**—In 1932, Ramdas and Atmanathan observed that

during clear nights the lowest temperatures occur a few cm or even 1 m or more above the ground rather than at the ground surface. Findings of other authors concerning this peculiarity are reviewed in this note. The phenomenon was also observed at Martonvásár Agrometeorological Observatory. *Subject Headings:* **1. Minimum temperatures 2. Nocturnal cooling.** —*G.T.*

10.7–223 551.524.37:551.509.612

†Angus, D. E., **Radiation frosts: their causes and local prevention in agriculture.** *Australian Institute of Agricultural Science, Melbourne, Journal*, 22(2):91–104, June **1956.** 3 figs. (incl. photos), 100 refs. **DLC**—After distinguishing between radiation and advection frost, the author then reviews in quantitative terms the various physical factors affecting the local balance of heat involved in the occurrence of radiation fog. The discussion covers the following aspects of the problem: nocturnal heat balance, including outgoing and back radiation, heat flow through soil, eddy conductivity in the air and latent heat; initial surface temperature; and air drainage. The discussion of preventive methods covers the physical methods for preventing radiation frost by modifying back radiation, heat flow through soil and release of latent heat and by direct heating of air and mechanical mixing of air. Also the various methods used are evaluated. *Subject Headings:* **1. Radiation frost 2. Heat balance 3. Nocturnal radiation 4. Radiation frost prevention.**—*I.L.D.*

10.7–224 551.524.37(776)

Beall, G. T. (*U. S. W. B., Minneapolis, Minn.*), **Average dates of first temperatures of 32°F. (freezing) 28°F., 24°F., and 20°F. in autumn for Minnesota.** *U. S. Weather Bureau, Weekly Weather and Crop Bulletin*, 43(41):7–8, Oct. 8, **1956.** 4 figs. **DWB, DLC, DA**—The northern section of Minnesota first experiences freezing temperatures from Sept. 10 to the end of the month. The northerly cold wind from Canada then sweeps into the southern part of the state during the first week of Oct. The average dates are mapped. *Subject Headings:* **1. Freezing temperature dates 2. Freezing temperature probabilities 3. Minnesota.**—*N.N.*

10.7–225 551.524.37:581.14(744)

Dye, L. M. (*Meteorologist in Charge, U. S. W. B., Airport, Worcester, Mass.*), **Freeze data in relation to growing season.** *U. S. Weather Bureau, Weekly Weather and Crop Bulletin*, 43(42):7–8, Oct. 15, **1956.** 2 figs. **DWB, DLC, DA**—Observations used in this paper were made by a cooperative observer at the Winter Hill Observatory, Worcester, Mass., with thermometers at a height of 5½ ft during 1926–1955. Listings were made of the last occurrence each spring when temperatures reached 24° or lower, 28° or lower, and 32° or lower. Similar listings were made for the fall. A part of the procedure employed was the following: averaging of standard deviations of date for each of the three freeze temperatures in spring and then doubling this average. The values of the mean freeze date for a particular freeze temperature, $\bar{X}$, are finally plotted on the 50% line of a sheet of "probability paper." *Subject Headings:* **1. Freeze data analysis 2. Growing season data 3. Worcester, Mass.**—*N.N.*

10.7–226 551.524.37:551.513.7

Kats, A. L. and Tiurina, K. I., **Tsirkuliatsionnye osobennosti zimy 1953/54 g.** [Circulation characteristics of the 1953 1954 winter.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:25–29, Jan. **1956.** 2 figs., table. **DWB, DLC.** Trans. into English available Special Libraries Association Translation Center (John Crerar Library, Chicago), as its R-40.—The winter of 1953–1954 was an abnormally cold winter for the southern part of the European U.S.S.R., the Caucasus, Western Siberia, Kazakhstan, Central Asia and for the southern half of Western Europe. The author enumerates some very severe winters, describes the severity of the 1953–54 winter, and discusses the temperature conditions during this winter, and the meridional and zonal circulations. A table giving the number of days with temperature less than normal for a number of stations, graphs showing the deviations from normal of the meridional and zonal circulations and their relationship to the general circulation and charts showing the natural synoptic periods of the pre-winter and winter are presented. *Subject Headings:* **1. Severe winters 2. Atmospheric circulation anomalies.**—*I.L.D.*

10.7–227 551.524.37(52)

Takeda, K. (*Kyushu Univ.*), **The frequency distribution and the return period of the last and the first frost days in Fukuoka.** *Journal of Agricultural Meteorology*, Tokyo, 13(1):5–6, July 1957. 3 figs., 4 refs., 4 eqs. In Japanese; English summary p. 6. **DWB**—A formula for the frequency distribution of the annual maximum (or minimum) values of meteorological elements deduced recently by A. F. JENKINSON is applied to the last and the first frost days in Fukuoka, and both frost days are found to be well fitted by the Type III curve of JENKINSON. Making use of the curve, return periods of the last and the first frost days are obtained, but they differ only slightly from that calculated under the assumption of the normal distribution. *Subject Headings:* **1. Frost frequency data 2. Fukuoka, Japan.**—*Author's abstract.*

10.7–228 551.524.4:551.510.42(410)

Spurr, G. (*Central Electricity Res. Lab., London*), **The penetration of atmospheric inversions by hot plumes.** *Journal of Meteorology*, Boston, 16(1):30–37, Feb. 1959. 5 figs., 4 tables, 5 refs., 12 eqs. **DWB, DLC**—Power-station chimneys emit hot gases which may be sufficiently buoyant to penetrate inversions associated with periods of smog. Two notable instances of smog in Great Britain have been examined, applying formulas derived by SUTTON and PRIESTLEY. A method has been suggested whereby an estimation may be made of the amount of heat required to ensure the penetration of an inversion by a plume. *Subject Headings:* **1. Inversion effects on atmospheric pollution 2. Smog 3. Stack meteorology 4. Great Britain.** —*Author's abstract.*

UPPER AIR TEMPERATURE

See: **World upper air temps.** (Goldie et al.), 10.7–25.

SOIL TEMPERATURE

See also: **Soil temp. texts.** (Shul'gin), 10.7–7; **SIPRE bibliog.** (Sherrod), 10.7–78.

10.7–229 551.525(712.7)

*†Beckel, D. K. Brown, **Studies on seasonal changes in the temperature gradient of the active layer of soil at Fort Churchill, Manitoba.** *Arctic*, Montreal, 10(3):151–183, 1957. 13 figs., 7 tables, 16 refs. **DLC**—This comprehensive investigation of the seasonal variation in the temperature gradient of the active soil layer is based upon soil temperature measurements made at depths ranging from 0 to 120 in. at 40 stations in swamp and high dry areas of forested and nonforested localities of the Churchill, Manitoba region. Copper-constantan thermocouples and a portable potentiometer were used. The records extended over a period ranging from 1950 to 1954. The contents of this study include the following: a brief summary of research on the intrinsic and extrinsic factors influencing soil temperatures; a description of the topography, vegetation, geology, climate (climatic summaries for Churchill given in a table) and soils of the Churchill environment; a detailed description of the method and apparatus, and an analysis of and data on the individual factors influencing soil temperatures. The latter includes data (presented in tables and graphs) on the extreme temperatures recorded for upper and lower depths of the active layer and on extremes for ambient air averaged over ten-day periods, comparison of dates at which ambient air surface, 12 in. depth and lower portion of active layer reach 0°C, variation of soil temperature with time for individual stations, dates of first and last measurable snow for the spring of 1951, spring and fall of 1952 and fall of 1954 with dates when average (over 10-day periods) ambient air temperature reached 0°C, relation between snow depth and soil temperature at 12 in., relation between insulation value of snow and snow depth, etc. *Subject Headings:* **1. Soil temperature variations 2. Fort Churchill, Manitoba, Canada.**—*I.L.D.*

10.7–230 551.525.4(676.2)

*McCulloch, J. S. G. (*East African Agricul. & Forestry Res. Organiz., Muguga, Kenya*), **Soil temperatures near Nairobi 1954–1955.** *Royal Meteorological Society, Quarterly Journal,*

85(363):51–56, Jan. **1959.** 3 figs., 4 tables, 10 refs., 3 eqs. **DWB, DLC**—Continuous records of soil temperature at Muguga, Kenya (1°13′S, 36°38′E) under bare soil at nominal depths of one, three and six inches and one, two and three feet were taken for the period 1954–1955. The form of the temperature wave proved remarkably constant from day to day and the diurnal variation was measurable down to about one foot. The mean of maximum and minimum temperature is a good approximation to the daily mean temperature, as obtained by numerical integration, at depths of 6 in. and over. Nearer the surface, however, the mean of maximum and minimum gives an overestimate of the daily mean temperature. The annual soil temperature wave was not sufficiently marked to justify a mathematical analysis, but the mean diurnal wave for selected ten-day periods was analyzed and values of thermal diffusivity were computed for the depth ranges 1–6 in. and 6–14 in. Despite seasonal changes in soil moisture content, diffusivity values proved remarkably constant with mean values of 0.0020 and 0.0015 $cm^2\ sec^{-1}$, respectively, for the two depth ranges. There was no obvious correlation with soil water changes. *Subject Headings:* **1. Soil temperature data 2. Muguga, Kenya, Africa.**—*Author's summary.*

10.7–231 551.525.5(798)

Drew, J. V. (*Univ. of Nebraska*); Tedrow, J. C. F. (*Rutgers Univ.*); Shanks, R. E. and Koranda, J. J. (*both, Univ. of Tennessee*), **Rate and depth of thaw in Arctic soils.** *American Geophysical Union, Transactions,* 39(4):697–701, Aug. **1958.** 4 figs., 7 refs. **DWB, DLC**—Measurements at Point Barrow, Alaska, indicate that rate and depth of thaw in Arctic soils are highly related to soil type. Arctic brown soil thawed earlier in the spring, thawed to a greater depth, and froze earlier in the fall than did the adjacent poorly drained areas. During 1956, Arctic brown soil thawed to a maximum depth of 40 in. while the depth of thaw in the nearby tundra soil approximated 18 in. Diurnal near-surface temperature amplitude was greater in the Arctic brown than the adjacent poorly drained areas. The willow-lichen-moss complex was the dominant vegetation with the Arctic brown soil, while in the tundra soil, it consisted mainly of *Dupontia-Carex-Eriophorum scheuchzeri.* Other vegetation units in relation to soils are given. *Subject Headings:* **1. Soil thawing 2. Soil types 3. Arctic soil temperatures 4. Point Barrow, Alaska.**—*Authors' abstract.*

10.7–232 551.311.1:551.525.5

Jackson, Kenneth A. and Chalmers, Bruce, **Study of ice formation in soils.** Harvard Univ. Div. of Engineering and Applied Physics, Contract DA-19-016-eng-3903, Technical Report, No. 65, May **1956.** 29 p. 10 figs., 11 refs., 6 eqs. **DWB** (M551.311 J13st)—The report is a reprint of an original contract document intended, from a metallurgical point of view, to apply recent advances in metal melting and freezing to the freezing of water in the spaces in soil. The remainder of this report is a qualitative discussion of the phenomena involved. The three appendices included are discussions on soil-moisture freezing temperature, on the derived cooling curves obtained from such temperature observations and on the qualitative theory of soil freezing and heaving. *Subject Headings:* **1. Ice formation 2. Soil freezing.** —*N.N.*

10.7–233 551.525.6:551.584.65(437)

Valovič, Šimon, **Mikroklimatický prieskum v Dobšinskej l'adovej jaskyni v r. 1952–1956.** [Microclimatic study in the Dobšina ice cave, 1952–56.] *Meteorologické Zprávy,* Prague, 10(4):91–94, **1957.** 3 figs., 5 tables, 6 refs. Russian and German summaries p. 91. **DWB**—Temperature and air flow data obtained at various points in Dobšina ice cave from 1952 to 1956 are tabulated. Earlier measurements are also given. The cave is identified as a partly static, partly dynamic one, with its upper level displaying a more dynamic and its lower level a more static regime. *Subject Headings:* **1. Ice caves 2. Cave microclimatology 3. Dobšina Ice Cave, Czechoslovakia.**—*G.T.*

WATER TEMPERATURE

See: **Temp., Lake Baikal** (Rossolimo), 10.7–33; **Water temp. eff. on polio** (Turner), 10.7–127; **Air-sea temp. variations, Poland** (Tyczka), 10.7–215.

PRESSURE AND WIND

PRESSURE

See also: **Stations reducing pressure to upper levels,** 10.7–75; **Pressure microvariations** (Berg), 10.7–146; **Differential kinematics** (Leese), 10.7–158; **Numerical surface pressure forecast.** (Brandejs, Zikmunda), 10.7–162; **Fjörtoft's method** (Brandejs et al.), 10.7–163; **Troposphere-ionosphere relationships** (Bauer), 10.7–185; **Pressure-thunderstorm correlations** (Innas, Lutfur), 10.7–201.

10.7–234 551.543:551.588.1

Bossolasco, Mario and Dagnino, Ignazio (*both, Genoa, Univ. Ist. Geof. e Geod.*), **L'influenza delle aree continentali sui centri di variazione della pressione atmosferica.** [Influence of continental areas on the variation centers of atmospheric pressures.] *Ricerco Scientifica*, Rome, 28(10):2045–2051, Oct. **1958.** 3 figs., 3 refs., 2 eqs. French, English and German summaries p. 2051. **DLC**—The authors investigate the frequency distribution of the positive and negative isallobaric centers, on the basis of the data collected in the three-year period 1954–1956 in Central-West Europe and the adjacent part of the Atlantic and Mediterranean Sea. The preliminary deductions here reported show that, as a rule, with respect to the open sea (ocean) the continental areas increase the rise of said centers. The authors also offer a theoretical interpretation of this result. *Subject Headings:* **1. Pressure variations 2. Continental effects on pressure centers.**—*Authors' abstract.*

10.7–235 551.543.1

Haurwitz, B. and Sepúlveda, Gloria M., **Geographical distribution of the semidiurnal pressure oscillation at different seasons.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 149–155. fig., 2 tables, 16 refs. **DWB, DLC.** Also issued as: *New York Univ. College of Engineering. Research Div. Dept. of Meteorology*, Contract AF 19(604)-1006, *Scientific Report* No. 6, Nov. **1956.** 18 p. fig., 6 tables, 11 refs., 16 eqs. **DWB**—Amplitudes and phases of the solar 12-hourly (S_2) pressure oscillation were obtained for 136 stations all over the earth for Jan., March, July,t and Sept. The data were grouped into latitude zones, and analyzed under the assumption of here being two components, one due to local time (W_2) and one to Greenwich time (Z_2). In Jan. W_2 was found to be asymmetrical (greater amplitude in Northern Hemisphere than in Southern Hemisphere, and vice-versa) in July and Sept. Seasonal variations are found by harmonic analysis. *Subject Headings:* **1. Semidiurnal pressure variations 2. Seasonal pressure distribution 3. Global pressure oscillations.**—*M.R.*

10.7–236 551.543(747)

Shirk, G., **Barometric pressure at New York City.** *Cycles*, N. Y., 9(3):103, March **1958.** fig., table. **DWB**—Barometric pressure at New York since 1873 shows variations having a period of 7–6 years and a typical amplitude of .010 in. of mercury above and below average. Similar cycles have been found in pressure at other places, in sunspot numbers and in pig iron prices. *Subject Headings:* **1. Pressure periodicities 2. New York, N. Y.**—*G.T.*

10.7–237 551.543.1:525.6

Thrane, P. (*Met. Inst., Oslo*), **The diurnal and the semidiurnal atmospheric solar tide.** *Tellus*, Stockholm, 10(4):415–429, Nov. **1958.** 3 figs., 7 refs., 70 eqs. **DLC**—World-wide oscillations generated by the sun are examined by applying the hydrodynamical equations to a rotating spherical model atmosphere. The oscillations are described as small perturbations on a static state in which the atmosphere is at rest relative to the earth's surface. Let $\dot{q}$ denote the heat supplied per unit mass and unit time. Let p and α denote perturbations in pressure and specific volume of a particle of air and let the displacement of the particle from its equilibrium position be given by θ, ψ, z, i.e., the variations of its colatitude, longitude and height, respectively. Consider the simplest oscillation of 24-hr period rotating with the sun:

$$\dot{q} = C_q \sin(\Psi + \eta_q), \qquad x = C_x \sin(\Psi + \eta_x)$$

where Ψ denotes local time reduced to angle and x denotes any one of the variables p, α, z, ψ, θ. The amplitudes and phase angles are variable with latitude and height. $\dot{q}$, p, α, z, ψ are symmetric with respect to the equator. It is shown that, if C_q, η_q are given as analytic functions of latitude and height, then the quantities C_x, η_x are determined by the equations of motion, the equation of continuity and the first law of thermodynamics. Considering in like manner the simplest oscillation of 12-hr period rotating with the sun:

$$\dot{q}=C_q \sin (2\Psi+\eta_q), \qquad x=C_x \sin (2\Psi+\eta_x)$$

we find that, when C_q, η_q are given, the C_x, η_x satisfying the above mentioned equations contain an arbitrary function of height, $f(Z)$. The absence in the first case of an arbitrary function which might be adapted to boundary conditions, may partly explain the weak development of the 24-hr wave as a global phenomenon in spite of the marked diurnal period in the heat supply $\dot{q}$. A special case of nonlinear equations is considered in order to study certain relations between the 24-hr and the 12-hr wave. A heat supply of 24-hr period of the form $\dot{q}=C_q \sin (\Psi+\eta_q)$ can generate a wave of 12-hr period. *Subject Headings:* **1. Diurnal atmospheric oscillations 2. Atmospheric tides 3. Solar tides.**—*Author's abstract.*

10.7–238 551.543.2(5)

*Japan. Meteorological Training School, **Harmonic coefficients of the annual variation of pressure over the Far East.** *Journal of Meteorological Research*, Tokyo, 9(6):441–448, July 1957. 3 tables. In Japanese. **DWB**—Tables give detailed data on 7a components and 5b components for each 5° coordinate from 90° to 180°E and 20° to 80°N for the surface, 500 mb and 700–1000 mb thickness. *Subject Headings:* **1. Annual pressure harmonics 2. Far East.**—*M.R.*

WIND

See also: **Temp.-wind velocity relationships** (Bossolasco, Dagnino), 10.7–216.

10.7–239 551.55(43)

Dinkelacker, Otto, **Die Verteilungsfunktion der Windgeschwindigkeit für die Hochrhön.** [The distribution function of the wind velocity over the Rhön Mountains.] *Wetter und Klima*, No. 9/10:257–270, 1948. **DWB.** Trans. into English issued by Sandia Corporation, Albuquerque, N. Mex., available. **DWB** (M52 D5844di)—Report of a study made by the Agricultural-Meteorological Research Office at Giessen on the possibility of using wind energy in the Rhön mountain region. The mountain stations recorded at night an annual velocity of 20 to 25% greater than velocities during the day. The report shows the graphical evaluation of the curves of wind velocities and the meteorological mean velocities as a function of the measured values. *Subject Headings:* **1. Wind velocity distribution 2. Rhön Mts., Germany.**—*N.N.*

TURBULENCE AND HORIZONTAL WIND DISTRIBUTION

See also: **Wind air-retard tables** (U. S. W. B.), 10.7–38; **Airplane motion in rough air** (Rhyne), 10.7–105; **Upper air wind forecast.** (Cole, Chamberlain), 10.7–106; **Numerical models including topographic effect** (Sawyer), 10.7–168; **Eddy motion** (Hesselberg), 10.7–192.

10.7–240 551.501.75 551.551

Buell, C. Eugene (*Kaman Aircraft Corp.*), **The correlation between wind and height on an isobaric surface, Pt. 2, Summer data.** *Journal of Meteorology*, Boston, 15(6):502–512, Dec. 1958. 10 figs., 5 refs., 15 eqs. **DWB, DLC**—The assumption that the two-point wind correlations are those expected from two-dimensional, homogeneous, isotropic turbulence leads to inconsistencies when applied to the wind-height correlations on the 500 mb surface in the summer. It is shown that these inconsistencies are due primarily to the nonfulfillment of the homogeneity assumption. Modifications to take into account the magnitude of the horizontal

gradient of the standard deviation of height are made. The modified results compare quite favorably with the observed data. The important modification developed consists of a change of the emphasis in the statistical assumptions made from an assumption that involves the wind correlations to an assumption regarding the nature of the height field and its two-point correlations. (For Pt. 1, *see* 10.6–152, June 1959, *MAB*.) *Subject Headings:* **1. Wind-height correlation 2. Upper air wind computation.**—*Author's abstract.*

10.7–241 551.551:551.524.1

Ogura, Yoshimitsu (*Johns Hopkins Univ.*), **Temperature fluctuations in an isotropic turbulent flow.** *Journal of Meteorology*, Boston, 15(6):539–546, Dec. **1958.** 3 figs., 29 refs., 41 eqs. **DWB, DLC**—An attempt is made to see what the results of the application of the methods of HEISENBERG are to isotropic temperature fluctuations in a stationary isotropic turbulence, under the restriction that temperature differences are too small to have any effect on the velocity field. The power spectrum for temperature fluctuations, thus deduced, degenerates to those obtained previously by CORRSIN at two extremes—i.e., in intermediate and highest wave number ranges. The shape of the correlation function is also derived and compared with the experimental results of SHIOTANI. Finally, the thermal microscale and the size of the smallest eddies are expressed in terms of the turbulent Reynolds number and Péclet number or the fluid Prandtl number. *Subject Headings:* **1. Isotropic turbulence 2. Turbulent temperature fluctuations.**—*Author's abstract.*

10.7–242 551.511.32:551.551.2:535.33

Frankenberger, Ernst, **Zur Anisotropie der atmosphärischen Grenzschichtturbulenz.** [Anisotropy of the atmospheric boundary layer turbulence.] *Annalen der Meteorologie*, Hamburg, 8(3 4):93–97, **1957.** 4 figs., table, 9 refs., 4 eqs. **DWB, DLC**—The author studied the spectral distribution of turbulent wind oscillations and their dependence upon wind velocity and height above the surface for the simplest case of an adiabatic temperature stratification. This spectral distribution of turbulent velocities up to 70 m above the ground was studied at the Quickborn measuring field of the Hamburg Meteorological Observatory and the results of studies on turbulent wind velocities under thermal adiabatic stratification published by E. K. WEBB (*see* 7.10–201, Oct. 1956, *MAB*); M. SHIOTANI (*see* 4B–239, Feb. 1953, *MAB*); and H. A. PANOFSKY (*see* 5.9–185, Sept. 1954, *MAB*) etc., are analyzed. The analysis of the fine wind structure is carried out by the mathematical technique of G. I. GRIFFITH and E. L. DEACON. It is evident that the spatial spectrum is independent of the wind velocity and that, in as far as the temperature stratification is adiabatic, the horizontal extensions of the turbulent elements carrying the vertical exchange increase with the square root of the altitude. *Subject Headings:* **1. Spectral distribution of turbulent velocities 2. Thermal adiabatic stratification 3. Turbulent boundary layer.**—*I.L.D.*

WIND VARIATIONS AND VERTICAL DISTRIBUTION

See also: **Squalls, Dum Dum Airport, Calcutta** (De), 10.7–137; **Upper air wind fluctuations** (Angell), 10.7–142; **Extratropical cyclones, squall-lines and gravity waves** (Tepper), 10.7–203; **Wind field in hurricanes** (Blumen, La Seur), 10.7–204.

10.7–243 551.553.8(426.7)

Dalgleish, R., **Extraordinary strong winds at North Weald.** *Meteorological Magazine*, London, 87(1029):78–80, March **1958.** 2 figs., table. **DWB**—North Weald, northwest Essex, Eng. experienced extraordinary strong winds on Jan. 8, 1957 between 0707 and 0717 GMT. Routine observation began at 0656 GMT, surface wind velocity was 215 degrees 20 kn, with gusts up to 28 kn which later increased to 56 kn from direction 265 degrees. From 0707 to 0717 a mean velocity of 265 degrees 35 to 40 kn was kept. The barograph traced a kick of p.9 millibar. No clearly marked cold front or trough could be detected with any certainty from the synoptic charts but the marked westward increase in conditional instability up to the 3000 ft level is evident from the upper air soundings from Camborne and Crawley stations. *Subject Headings:* **1. Strong wind analysis 2. Essex, Eng.**—*N.N.*

SPECIAL WINDS AND WIND EFFECTS

See also: **Condensation by shelter belts** (Sus), 10.7–10; **Drought and shelter belt bibliogs., U.S.S.R.**, 10.7–82; **Wind eff. on storm tides, N. Sea** (Lauwerier), 10.7–85; **Wind energy utiliz., U.S.S.R.** (Vinter, Fateev), 10.7–110.

10.7–244 551.555.3

Frey, Karl, **Zur Diagnose des Föhns.** [Föhn analysis.] *Meteorologische Rundschau*, Berlin, 10(6):181–185, Nov. Dec. **1957.** fig., 6 tables, 15 refs. **DWB, DLC**—Differences in the criteria used to determine the presence of föhn winds—whether they be three-fold criterions of temperature, relative humidity and wind direction (CONRAD'S approach), temperature gradients between valley and mountain peak station, etc.—are responsible for contradictory results in föhn analyses. In order to distinguish between weak föhn and intensified mountain wind, criteria supplementing those employed at the föhn station have been developed. There are the atmospheric pressure difference between the north and south side of the Alps, the horizontal temperature differences between a föhn station and a föhn free station and also the vertical temperature gradients and the temperature gradients along a föhn valley. Data on the annual daily distribution of föhn in Altdorf, the pressure difference between Zurich-Lugano and the isobar temperature difference Santis-Gotthard, the temperature differences Altdorf-Zurich and Altdorf-Lugano, the temperature gradients as measured with the radiosonde and on the anticyclonal valley föhn and the classification of föhn winds are presented and analyzed. A classification of föhn winds is proposed: anticyclonic föhn, anticyclonic föhn aloft, cyclonic föhn aloft, cyclonic valley föhn, anticyclonic valley föhn, "Dimmenföhn" and local föhn. *Subject Headings:* **1. Föhn analysis 2. Föhn classification 3. Föhn winds.**—*I.L.D.*

10.7–245 551.555.8(47)

Bova, N. V., **O pyl'nykh buriakh v Zavolzh'e.** [Dust storms in the Transvolga.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:29–31, **1957.** 3 tables, 2 refs. **DWB, DLC**—With the increasing cultivation of sandy and clayey-sandy soils in the semi-arid regions during recent years, new centers of wind erosion have arisen. On the basis of a 20 yr record (1936–1955), the author analyzes the frequency and characteristics of dust storms in the Saratov Oblast. Data are presented on the mean monthly number of days with strong dust storms and the mean and maximum number of days for the period April–Oct., the frequency (in per cent) of storms at different times of day and their duration in hours and on the weather associated with dust storms. The average number of days with dust storms is 5–6 and 13–15 during drought years. They are most frequent in the summer. Mean duration of a dust storm is 1–3 hrs. Dust storms are closely associated with dry weather, in particular with sukhovei winds. *Subject Headings:* **1. Dust storm frequencies 2. Saratov Oblast, U.S.S.R.**—*I.L.D.*

UPPER AIR WINDS

See also: **Jet stream flying, N. Atlantic** (Reynolds, Chandler), 10.7–104; **Radar meas. of upper air wind** (Barbé), 10.7–149; **Differential kinematics** (Leese), 10.7–158; **Jet stream forecast.** (Kaufmann), 10.7–174; **Atmos. pollution trajectory studies, Calif.** (Holzworth), 10.7–181; **Tropopause chart analysis** (Defant), 10.7–186; **Long, lee and gravity waves** (Ball), 10.7–199; **Min. temps. and cold waves, India** (Hariharan), 10.7–220.

10.7–246 551.557.3(522.2

Fujita, Mitsuyoshi, **Statistical studies on the upper winds at Tomie.** *Journal of Meteorological Research*, Tokyo, 9(7):533–535, July **1957.** 2 figs., 2 tables, 2 refs. In Japanese. **DWB, DLC**—Maximum frequency of wind occurs in Oct. and minimum in July. Description and graphs of wind speed profile in different seasons are given. Wind speed is maximum from Jan.–Feb., then decreases gradually through March and reaches minimum in Aug. Frequencies of wind direction at different altitudes (200–2000 m) are tabulated and described. *Subject Headings:* **1. Upper air wind data 2. Wind frequency data 3. Tomie, Japan.**—*J. Wo*

VERTICAL MOTION

See also: **Lee waves and Lyra theory** (Zierep), 10.7–108; **Numerical models including topographic effect** (Sawyer), 10.7–168; **Precip. and numerical forecast.** (Smebye), 10.7–169; **Long, lee and gravity waves** (Ball), 10.7–199.

10.7–247 551.558:551.577.21(47)

Semenov, V. G., **Sviaz' vertikal'nykh dvizheniĭ s osadkami na Evropeĭskoĭ territorii SSSR v zimnie mesiatsy.** [The relation between vertical movements and precipitation in European U.S.S.R. during the winter months.] *Meteorologiia i Gidrologiia*, Leningrad, No. 10:25–28, Oct. **1957.** fig., 3 refs., 2 eqs. **DWB, DLC**—The author examines the methods of calculating areal means of vertical velocities from the geostrophic wind, analyzing their relationship with anomalies of decadal precipitation totals. A verbal description of the development of the method for calculating vertical velocities and the equations for calculating transport of air masses through any vertical section is presented; namely $\frac{\partial M}{\partial t} = \frac{z}{l}(\bar{p}_2 - \bar{p}_1)$ where $\frac{\partial M}{\partial t}$ —mass transported through a given cross-section in one second; z—height of the cross section, mean value of the Coriolis parameter between 1 and 2; $\bar{p}_1$ and $\bar{p}_2$—mean value of pressure (for layer z) for the boundaries of the cross-section (at points 1 and 2). The vertical velocity is computed by means of the equation $w_i = \frac{DM_i}{\rho_i s}$ where w—mean vertical velocity for the area at the boundary i of the layer; $DM^1{}_i$ balance of masses for 1 sec in the i layer; ρ_1—mean density in the i layer (according to secular data); and s—area. With the aid of these formulas w is calculated by the equation $w = \frac{z}{2w a \bar{\rho}} \frac{\cos \varphi \partial \bar{p}}{\sin^2 \varphi \partial x}$. A comparison of computed areal decadal vertical velocities with areal decadal precipitation for 20 stations distributed over the U.S.S.R. showed that positive values of vertical velocity in the majority of instances correspond to excess precipitation while negative values of vertical velocity correspond to a deficit of precipitation. Further analysis shows that the agreement of precipitation deficit with downward currents is better than with upward currents. *Subject Headings:* **1. Vertical velocity-precipitation relationships 2. Precipitation amount 3. European U.S.S.R.**—*I.L.D.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: **Moisture balance of tropics** (Ivanov), 10.7–26; **Glossaries** (Zamorskiĭ), 10.7–55; **Chilling bioclimat.** (Iampietro et al.), 10.7–126.

10.7–248 551.571.2:517.512.2

Peixoto, José P. (*Univ. of Lisbon*) and Saltzman, Barry (*M.I.T., Mass.*), **Harmonic analysis of the mean Northern Hemisphere water vapor distribution for the year 1950.** *Geofisica Pura e Applicata*, Milan, 41:183–188, **1958.** 4 figs., table, 13 refs., 7 eqs. **DLC**—Harmonic analyses along lat. 30°, 45° and 60° of the mean Northern Hemisphere water vapor field are presented. The seasonal variations of these spectra are investigated and the relative contributions of the various scales of mean eddies to the meridional transport of water vapor are calculated. Of special interest is the finding that perturbations of wave number 2, corresponding to the great continents and oceans, are dominant at all three latitudes and of primary importance in effecting the northward transport of water vapor. *Subject Headings:* **1. Water vapor distribution 2. Northern Hemisphere water vapor distribution 3. Harmonic analysis of water vapor distribution.**—*Author's summary.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **Evaporability map of world** (Ivanov), 10.7–47; **Water supply and potato yield** (Scholte), 10.7–111; **Evaporation meas.** (Elnesr), 10.7–134.

10.7–249 551.573:551.501(282.242)

Cochrane, N. J. (*Sir Wm. Halcrow & Partners, London*), **Observable evapotranspiration in the basin of the River Thames.** *Royal Meteorological Society, Quarterly Journal*, 85(363):57–59, Jan. **1959.** fig., 14 refs. **DWB, DLC**—The measurement of evapotranspiration from large land areas is, like the measurement of evaporation from large areas of water, a formidable problem and not often accurately accomplished. Nevertheless, it is essential for an engineer to try to check the results of theoretical or empirical analyses, or small-scale experiments, against nature where natural phenomena are concerned and the results of an analysis of the hydrology of the Thames are presented herein. Conclusions favoring the Thornthwaite method are reached. *Subject Headings:* **1. Evapotranspiration measurement techniques 2. River hydrology 3. Thames River Basin.**—*Author's summary.*

10.7–250 551.573(64)

Emon, J., **L'évaporation au Maroc.** [Evaporation in Morocco.] *Rabat, Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologie, Annales*, 17:87–102, **1957.** 4 figs., 4 tables, 15 refs. **DLC**—Study of the evaporation measurements at 16 stations of the Moroccan synoptic network (period 1949–1953). The author successively considers the geographical variation of annual totals, the variation and amplitude of variation of the daily average evaporation, the extreme values of the daily evaporation, the diurnal evaporation (6 a.m. to 6 p.m.) and the nocturnal evaporation (6 p.m. to 6 a.m.). The main conclusions of this study are: 1) the almost negligible influence of the wind factor contrasted with the preponderant role played by air temperature and humidity; 2) the remarkable influence of the seasonal variation of relative humidity over the Atlantic coast; 3) the high annual evaporation (nearly 5000 mm) in the pre-Saharian region; 4) the tendency to a decrease, in the inland and southern regions, of the ratio between diurnal and nocturnal evaporation. *Subject Headings:* **1. Evaporation 2. Morocco.**—*A. V.*

10.7–251 551.573

Evstigneev, A. S. and Popov, A. N., **Ob isparenii s vodnoĭ poverkhnosti porosshcheĭ rastitel'nost'iu.** [Evaporation from water surface covered with vegetation.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:32–34, April **1957.** fig., 3 tables, eq. **DWB, DLC**— Preliminary data on evaporation attained from a concrete reservoir (8×12×0.8 m) divided into four equal sections in each of which evaporimeters (G.G.I. 3000) were set up; one section was free of vegetation; each of the other three was overgrown with either bullrushes or duckweed and water plantain. Data are presented on total evaporation from each plot for the entire period June-Oct. for each year 1953–1955, for each month of this period and for total evaporation by day and night for each plot for each year. Total evaporation was greater from plot with bullrushes; the plot with duckweed had the lowest total evaporation, while the open water was next to the lowest. The mean monthly evaporation as a multiple of evaporation from open water is 2.2 for the bullrush plot, 1.38 for the water plantain, and 2.3 for the duckweed. The mean total evaporation at night for the bullrushes is 24%, for the duckweed 48%, for the water plantains 46%, and for the open water 75% of the diurnal evaporation. *Subject Headings:* **1. Evaporation from water surfaces 2. Evaporation from vegetation covered water surfaces 3. Evaporation data.**—*I.L.D.*

10.7–252 551.573(52):551.579

Kubo, J., **Water surplus and deficit at Tokyo.** *Japan. Meteorological Agency, Memoirs of Industrial Meteorology*, 21(2):93–103, **1958.** 4 figs., 8 tables, 16 refs., eqs. In Japanese; English summary p. 103. **DWB**—For industrial meteorological purposes, it is quite important to ascertain the water balance (or water surplus and deficit) at a place. In 1948, C. W. THORNTHWAITE proposed the concept of potential evapotranspiration and elaborated the method of determining potential evapotranspiration and water balance. In this paper, the

author explains, in the first place, the method of determining potential evapotranspiration and water balance, and shows the water balance at Tokyo for the normal year, and for 1944 and 1943. Secondly, calculating the water balance for Tokyo for each year of the 80 yrs [1876–1955], the author shows the annual progression of water surplus and deficit, and the occurrence frequency of monthly water surplus and deficit. Thirdly, the author shows the annual water surplus and deficit at Tokyo, and further shows the occurrence probability of annual water deficit and its confidence limit with confidence coefficient of 90%. *Subject Headings:* **1. Water budget calculations 2. Potential evapotranspiration 3. Tokyo, Japan.**—*Author's abstract.*

CONDENSATION

See also: **Micromeritics texts** (Orr, Dallavalle), 10.7–6; **Duvdevani dew gage** (Krečmer), 10.7–135; **Condensation nuclei formation** (Knot), 10.7–150; **Condensation nuclei recording instruments** (Murphy), 10.7–151; **Condensation nuclei recording instruments** (Pollak), 10.7–152; **Freezing nuclei** (Facy), 10.7–179; **Cloud seeding with silver iodide** (Facy), 10.7–180; **Hurricane structure** (Woodcock), 10.7–205.

10.7–253 551.574.1:551.576.11:551.508.765

Braham, R. R., Jr.; Ackerman, Bernice and Brown, Edward N., **Hurricane cloud physics research.** Chicago. Univ. Dept. of Meteorology, Contract Cwb-9021, *Final Report*, Jan. 31, 1958. Contents: 70 p. figs., tables, refs. Contents: Ackerman, Bernice: **Analysis of liquid water measurements made during the 1956 flight operations,** p. 5–50. Brown, Edward N.: **Technique for measuring precipitation particles from aircraft,** p. 51–68. **Pneumatically operated cloud droplet sampler,** p. 69–70. **DWB** (M74.1 C534te, Final)—An analysis of liquid water content measurements during 252 airplane penetrations (at 2600–6200 ft) of over-water tropical Cumulus whose bases were 2580–3000 ft and tops 6000–11,000 ft with a hot-wire, liquid water content meter, manufactured by Johnson-Williams, Inc. of Palo-Alto and originally developed by the NACA, mounted in a B-50 airplane. Variations with height, time and space frequency distribution (maximum values, thickness and types of clouds, size of clouds), areal distribution, diurnal variations, etc. are shown in statistical tables and evaluated. *Subject Headings:* **1. Liquid water content meters 2. Tropical cumulus water content. I. Chicago. Univ. Dept. of Meteorology.**—*M.R.*

10.7–254 551.574.11(415)

Georgii, H. W. (*Univ. für Met. & Geophysik, Frankfurt a.M.*) and Metnieks, A. L. (*School of Cosmic Physics, Dublin Inst. for Advanced Studies, Dublin*), **An investigation into the properties of atmospheric freezing nuclei and sea-salt nuclei under maritime conditions at the west coast of Ireland.** *Geofisica Pura e Applicata*, Milan, 41:159–176, **1958.** 6 figs., 4 tables, 19 refs. German and English summaries p. 159. **DLC**—Parallel measurements of the concentration of freezing nuclei and sea salt particles, carried out on the west coast of Ireland during summer 1958 to study the activity of sea salt particles in the process of ice nucleation of supercooled clouds, are described and discussed. The results indicate that the concentration of freezing nuclei, active above −30°C, has no relationship to that of the sea salt particles. A pronounced increase of the freezing nucleus concentration was observed during advection from the mainland showing that even under maritime conditions the most active freezing nuclei are particles of continental origin. *Subject Headings:* **1. Freezing nuclei 2. Sea salt nuclei 3. Nuclei in marine air 4. Ireland.**—*Authors' summary.*

10.7–255 551.574.11

Isono, K. (*Geophysical Inst., Tokyo Univ.*), **On ice-forming nuclei.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 35(1):67–70, Feb. **1957.** 3 figs., 4 refs. **DWB, DLC**—Cold chamber experiments for testing nucleating properties of various particles are described. It is found, among other details, that hygroscopic nuclei are effective as ice forming nuclei below water saturation, while nonhygroscopic nuclei are effective only near or above water saturation. Silver nitrate (which produces faster ice crystal growth than silver iodide) and cadmium iodide are effective as ice forming nuclei below 5°C. *Subject Heading:* **1. Nuclei effectiveness.**—*G.T.*

10.7–256 551.574.11

Maenhout-Van der Vorst, W. and Maenhout, A. G., **La théorie de Bergeron et la croissance des cristaux.** [Bergeron's theory and the growth of crystals.] *Ciel et Terre*, Brussels, 74(7/8):359–364, July/Aug. **1958.** 3 figs., 8 refs. **DLC**—The authors review briefly the principles of BERGERON'S theory and some notions relating to the theory of the growth of crystals. The crystals present in the upper part of the cloud do not grow larger; the natural selection which occurs is explained by the authors by the theory of crystal growth. The defects of the network play an important part and make it possible to explain the natural selection which occurs in the upper part of a composite cloud. *Subject Headings:* **1. Cloud physics 2. Bergeron's theory 3. Ice crystal growth.**—*A. V.*

10.7–257 551.574.11:551.510.41

Robbins, R. C.; Cadle, R. D. and Eckhardt, D. L. (*all, Stanford Res. Inst.*), **The conversion of sodium chloride to hydrogen chloride in the atmosphere.** *Journal of Meteorology*, Boston, 16(1):53–56, Feb. **1959.** 2 figs., 2 tables, 14 refs., 6 eqs. **DWB, DLC**—A reaction route is suggested, based on experimental results, for the conversion of sodium chloride particles to gaseous hydrogen chloride in the atmosphere. The first step is the hydrolysis of nitrogen dioxide (NO_2) to form nitric acid (HNO_3) vapor. The second step is either adsorption on the relatively dry sodium chloride particles at relative humidities less than about 75% or, at high relative humidities, solution in aqueous droplets containing sodium chloride. The third step is interaction of the nitric acid and sodium chloride, and the fourth is desorption of the hydrogen chloride, either immediately following the reaction or during subsequent evaporation of the droplets. The results also indicate that the reaction between nitrogen dioxide and sodium chloride to form nitrosyl chloride (NOCl) and sodium nitrate ($NaNO_3$), often suggested as a possible primary step in the formation of chlorine or hydrogen chloride in the atmosphere, occurs at a negligible rate compared with the reaction described above. *Subject Headings:* **1. Sodium chloride nuclei 2. Hydrogen chloride in atmosphere 3. Atmospheric composition.** —*Authors' abstract.*

10.7–258 551.574.12:551.576.11

Squires, P. (*Division of Radiophysics, C. S. I. R. O., Australia*), **The spatial variation of liquid water and droplet concentration in cumuli.** *Tellus*, Stockholm, 10(3):372–380, Aug. **1958.** 2 figs., 5 tables, 10 refs. **DLC**—Measurements of liquid water content and droplet concentration in cumuli over path lengths of about one metre have been used to investigate the structure of these clouds. The measurements indicate that the cloud process is far from adiabatic, and that a dominating role is played by the admixture of drier air from outside the cloud. They suggest, further, that the main source of this dry air may be the region above the cloud top. *Subject Headings:* **1. Liquid water content of clouds 2. Tropical clouds 3. Cumulus cloud structure.**—*Author's abstract.*

FOG

10.7–259 551.575.36:551.510.42(54)

Mukherjee, Asoke Kumar (*Met. Office, Barrackpore*), **A possible role of atmospheric pollution on the frequencies of fog at Alipore, Dum Dum and Barrackpore.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):103–105, Jan. **1959.** fig., 4 refs. **DWB, DLC**—In a recent paper on the formation of fog at Alipore, Dum Dum and Barrackpore airports, BASU (*see* 7.2–214, Feb. 1956, *MAB*) reached the following conclusions regarding frequencies of fog at these three observatories around Calcutta: (1) annual frequency of fog is higher at Dum Dum than either at Alipore and Barrackpore; (2) during the coldest months, i.e., Dec. and Jan., Alipore has more cases of fog than either Dum Dum or Barrackpore; (3) in Feb., the frequency of fog at Dum Dum increases more rapidly than at Barrackpore, while that at Alipore starts decreasing; and (4) in March, the frequency of fog falls rapidly at Alipore and Barrackpore but does so only gradually at Dum Dum. He explained these observations from a study of the physical factors in the three different localities. In a big city like Calcutta, with a huge population and high concentration of industrial plants nearby,

the concentration of atmospheric pollution in different localities must play an important role in determining frequencies of fog in each area. BASU (1954) only touched this point in explaining his second conclusion mentioned above. He did not, however, consider how far the phenomenon of atmospheric pollution may corroborate his other conclusions (obtained by statistical analysis of the observational data). In this note an attempt has been made to understand the contribution of atmospheric pollution in the formation of fog. *Subject Headings:* **1. Atmospheric pollution effects on fog formation 2. Fog frequency studies 3. India.** —*Author's abstract.*

CLOUDS

See also: **Liquid water content of clouds** (Squires), 10.7–258; **Poor visibility statistics, India** (Ramamurthi), 10.7–292.

10.7–260 551.576(522.1)

Tomitaka, Shiro, **Statistical study on clouds at Fukuoka.** *Journal of Meteorological Research*, Tokyo, 9(7):524–528, July **1957.** 13 figs., table. In Japanese. **DWB, DLC**— Monthly frequencies of various types of high, medium and low clouds in Fukuoka from the data of 1953 are graphed and listed. Nocturnal variation of cloudiness is 50–60%, daytime variation is 70%. Maximum cloudiness occurs in the morning and evening of the Bai-u period (June–July) and the minimum at midnight in summer. Tabulations of altitudes of various types of clouds are given. Cu and Sc types (of cloud) are high from fall to winter and low from spring to summer. The experimental equation of freezing altitude (the altitude at which rising unsaturated humid air adiabatically starts to freeze) in functions of ground air temperature and humidity using HENING'S and KOSIEK'S equation is obtained. However, the result is not too accurate. *Subject Headings:* **1. Cloud frequency data 2. Fukuoka, Japan.** —*J. Woo.*

10.7–261 551.576.11:551.508.765

Draginis, Milton (*Univ. of Chicago*), **Liquid water within convective clouds.** *Journal of Meteorology*, Boston, 15(6):481–485, Dec. **1958.** 7 figs., 2 tables, 7 refs. **DWB, DLC**— Measurements of liquid water content in cumulus clouds were made with a device which records changes of conductivity of a paper tape with changes of wetness. One series of measurements was made in tropical cumuli; another was made in clouds over the central U. S. Examples of the variability of liquid water in convective clouds and typical values are given. It was found that the high values of liquid water content occurred in clouds in which precipitation formed. Comparisons of the observed values of liquid water with theoretical values based on an assumption of moist-adiabatic air ascent, without mixing, lead to the conclusion that clouds with precipitation contain regions where the liquid water exceeds the theoretical amounts. *Subject Headings:* **1. Liquid water content of clouds 2. Liquid water content meters.** —*Author's abstract.*

10.7–262 551.576.11:551.558.1

Squires, P. (*Radiophysics Lab., C. S. I. R. O., Australia*), **Penetrative downdraughts in cumuli.** *Tellus*, Stockholm, 10(3):381–389, Aug. **1958.** table, 18 refs., 7 eqs. **DLC**— Observations of cumuli have shown that the adiabatic model is quite inadequate, and that dry air must mix with the condensing upcurrent. Theories of the interaction between cumuli and their environment are discussed. The hypothesis that dry air enters these clouds chiefly from above is examined quantitatively. It is found that, as a result of evaporative cooling, such air could penetrate several kilometers into a growing cloud. This hypothesis accounts for the fine structure which is observed, and provides a natural and simple explanation for the fact that the lapse rate in cumuli is steeper than the wet adiabatic, and indeed approximates closely to that of the environment. Unlike alternative theories, it provides a means whereby the liquid water content may be automatically self-limiting, as the observations seem to require, as the motions which introduce dry air deep into the cloud depend for their energy supply on the presence of liquid water, and have velocities which are roughly proportional to its concentration. *Subject Headings:* **1. Cumulus cloud structure 2. Downdrafts in cumulus clouds.**—*Author's abstract.*

10.7–263 551.576.11:551.574.11

†Warner, J. and Squires, P. (*both, Radiophysics Lab., C. S. I. R. O., Australia*), **Liquid water content and the adiabatic model of cumulus development.** *Tellus*, Stockholm, 10(3): 390–394, Aug. 1958. 2 figs., 19 refs. **DLC**—The literature shows considerable disagreement concerning the liquid water contents found in cumuliform cloud and the relation of observed values to those deduced from the adiabatic model. The present paper describes some observations in which two methods of measuring liquid water have been used simultaneously and found to be in good general agreement. However, the two methods employed very different averaging periods, so that individual measurements were not strictly comparable. These results, and the observations of other workers, are discussed in relation to the general level of liquid water in cumuliform cloud and its variability in space. *Subject Headings:* **1. Liquid water content of clouds 2. Cumulus cloud formation.**—*Authors' abstract.*

10.7–264 551.576.12:551.577.36(729.5)

Battan, Louis J. (*Dept. of Met., Univ. of Chicago*), **Influence of the environment on the initiation of precipitation in tropical cumuli over the ocean.** *Tellus*, Stockholm, 10(4):466–471, Nov. 1958. 8 figs., 9 refs. **DLC**—An analysis has been made of the day-to-day variation of the likelihood of precipitation in cumulus clouds observed over the ocean in the vicinity of Puerto Rico. It is shown that the probability of rain in a cloud having a particular height depends on environmental conditions, and that the principal factors governing precipitation initiation are stability, vertical wind shear and depth of the moist layer. On the west side of polar troughs moving into the tropics, these parameters have values which make precipitation likelihood small. *Subject Headings:* **1. Precipitation probability 2. Tropical clouds 3. Cumulus clouds 4. Puerto Rico.**—*Author's abstract.*

PRECIPITATION

See also: **Rainfall prob., Rufiji Basin, Tanganyika** (Otnes), 10.7–34; **Water supply and potato yield** (Scholte), 10.7–111; **Precip. and numerical forecast** (Smebye), 10.7–169; **Storm rainfall** (Elliott), 10.7–178; **Sunshine duration-precip. relationships** (Conrad), 10.7–210; **Vertical velocity-precip. relationships, Europ. U.S.S.R.** (Semenov), 10.7–247; **Precip. prob., Puerto Rico** (Battan), 10.7–264.

10.7–265 551.577.2(54)

Sinha, K. L. (*Met. Office, Poona*), **Seasonal features of the spatial distribution of rainfall in pre-partitioned India.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):47–56, Jan. 1959. 3 figs., table, 2 refs. **DWB, DLC**—The spatial distribution of rainfall in accordance with the practice prevalent in the India Meteorological Department, viz, "few falls," "local" and "widespread" during the four seasons and the whole year in the different meteorological sub-divisions of pre-partitioned India have been studied with a view to finding those common features that may exist between the three types of rainfall distribution. Distribution of total number of rainy days in the various meteorological sub-divisions during the four seasons and the year have also been discussed. *Subject Headings:* **1. Seasonal rainfall distribution 2. India.**—*Author's abstract.*

10.7–266 551.577.35(545):551.509.318

§Mooley, D. A. (*Regional Met. Center, Nagpur*), **Rainfall distribution over Delhi State during monsoon.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):57–66, Jan. 1959. 6 figs., 7 tables. **DWB, DLC**—Based on data for the period 1939–1954, the mean values of rainfall and number of rainy days during the monsoon season at the various rain gage stations, as well as the extreme values of these, have been given; spatial distribution of heavy rainfall over the State and the incidence of heavy rainfall at the various locations have been studied. From a study of the synoptic charts on days prior to the days on which local heavy rainfall was reported, an attempt has been made to indicate the typical synoptic situations which usually lead to local heavy rainfall over Delhi State during the next 24 hrs. Typical situations have been illustrated by charts. *Subject Headings:* **1. Monsoon rain distribution 2. Synoptic conditions for heavy rainfall 3. Delhi state, India.**—*Author's abstract.*

10.7–267 551.577.37:551.579.4(713)

Anderson, D. V. (*Physicist, Dept. of Lands and Forests, Maple, Ontario*) and Bruce, J. P. (*Met. Service of Canada*), **The storm and floods of Oct. 1954 in southern Ontario.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology Toronto, Sept.* 1957, [*Transactions*], Vol. 3, pub. **1958.** p. 331–341. 5 figs., 3 tables, 7 refs. **DWB** (M(06) I611g) —The storm of Oct. 14–16, 1954 produced the greatest six hr to 48 hr rainfalls on record in Ontario. A brief review is given of the meteorological events of this storm and of historical storms of a similar nature. A depth-area-duration analysis of the rainfall is presented and the effects of the distribution of the rainfall on the runoff of main and tributary watersheds in southern Ontario are discussed. In the part by D. V. ANDERSON, field surveys were made of the Oct. 14–16 floods in southern Ontario. They revealed the effects of the flood on river channels, bridges and other structures. Detailed observations were made to reconstruct the hydrological history of the floods in the 350 sq mi basin of the Humber, where several methods were used to estimate hydrographs for its main and subsidiary branches. Comparison could then be made there between runoff and precipitation. Accordingly, the infiltration to ground water could be determined in its sub-watersheds which have a variety of hydrological characteristics as a consequence of differences in topography and composition of overburden produced by glacial action. A review is presented of the field methods employed and the results obtained in these studies. *Subject Headings:* **1. Floods, Southern Ontario (1954) 2. Rainstorms 3. Southern Ontario, Canada.**—*Authors' abstract.*

RAIN, SNOW AND HAIL

See also: **Hail prevention and cloud seeding with silver iodide, Switz.,** 10.7–32; **Snow cover surveys, U.S.S.R.,** 10.7–43; **SIPRE bibliog.** (Sherrod), 10.7–78; **Forest influences on snow cover, N. Hampshire** (Baldwin), 10.7–291.

10.7–268 551.578.11:551.577.37

Muchnik, V. M., **K obrazovaniiu krupnykh kapel' livnevykh (grozovykh) dozhdeĭ.** [The formation of large drops in heavy (thunderstorm) rainfall.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy,* 4:42–44, **1955.** fig., table, 4 refs.—An attempt is made to determine whether large drops are formed in cumulus rain clouds from snowflakes or hail. For this purpose the author used observations from mountain stations located in the northern Alps, Carpathian Mountains, and in the Caucasus. Days on which ice grains and hail occurred were observed and a graph showing the number of such days from May to Sept. as a function of height was constructed. Below 1000 m the number of days with hail is constant, but it begins to increase above this level. Days with ice grains are never observed below 1000 m. The indication that droplets are formed during showers from melted hail or ice particles indirectly, confirmed by the above facts, is sustained by data on the frequency of rainfall with thunderstorm recorded at the Zugspitze (2962 m) for a period of six yrs. It is seen that, since in a considerable number of cases thunderstorms with hail occur at positive temperatures at a height of 3 km, the level of the 0° isotherm in thunderstorms must be at such a height as to permit the ice particles to grow at a sufficiently high elevation and to form large drops. *Subject Headings:* **1. Thunderstorm rainfall 2. Large drop growth theories.** —*I.L.D.*

10.7–269 551.578.11

Wexler, Raymond (*Blue Hill Met. Obs.*) and Atlas, David (*A. F. Camb. Res. Center*), **Moisture supply and growth of stratiform precipitation.** *Journal of Meteorology,* Boston, 15(6):531–538, Dec. **1958.** 3 figs., table, 23 refs., 28 eqs. **DWB, DLC**—The steady-state water-budget theory is developed for stratiform precipitation. The variation of cloud liquid water with altitude in a layer depends on the rate at which it is produced by the updraft and depleted by the precipitating particles. Calculations representing this balance are made for a model cloud which follows the wet adiabat and has a parabolic distribution of vertical velocities and an exponential particle-size distribution. In the rain portion of the cloud, accretion is the only significant growth process; production exceeds consumption, so that liquid water is stored as cloud with a maximum content of 0.2 to 0.3 gm^{-3} at the +2C level.

Within the melting layer the growth rate increases, due to the combined effects of condensation and accretion, and cloud liquid water is sharply depleted. In a narrow layer just above the 0C level, production again exceeds consumption, and a secondary maximum of cloud liquid water occurs at about the −2C level. At colder temperatures, the rate of growth by sublimation increases and cloud liquid water vanishes at about −4C for a surface precipitation rate of 2 mm hr^{-1}, and above −10C for 10 mm hr^{-1}. Thus, at low precipitation rates, icing is confined to a narrow layer just above the 0C level, while at higher rates it may occur at much colder temperatures in combination with snow. The stratiform precipitation process is shown to be extremely efficient with these implications: (1) cloud storage need not be considered in quantitative calculation of precipitation rates; (2) artificial seeding only serves to impose a small perturbation on the precipitation rate with no increase in the net amount, although in a moving system it may be possible to increase rainfall by 5 to 10% at a given locality at the expense of the precipitation downstream. *Subject Headings:* **1. Liquid water content of clouds 2. Cloud structure 3. Drop size distribution.**—*Authors' abstract.*

HYDROMETEOROLOGY

See also: **Hydrologic forecast. texts** (Popov), 10.7–12; **Spectral reflectivity of soils** (Andronikov), 10.7–211; **Winter temp.-run off correlations, Japan** (Arakawa, Tsutsumi), 10.7–217; **Water budget calculations, Tokyo, Japan** (Kubo), 10.7–252; **Floods, S. Ontario, Canada, Oct. 1954** (Anderson, Bruce), 10.7–267.

10.7–270 551.509.58:551.579.4

Sokolovskiĭ, D. L., **O metodike rascheta maksimal'nykh raskhodov i gidrografov vesennego polovod'ia.** [A method of calculating the maximum discharge and the hydrographs of spring floods.] *Meteorologiia i Gidrologiia*, No. 5:35–40, May **1956.** 4 figs., 9 refs., 13 eqs. **DWB, DLC.** Transl. into English available for reference U. S. Weather Bureau Library (M79.6 S6834)—The author develops a nice complete genetic method for forecasting a flood on the basis of the course of water discharge and on considerations of the morphological and hydrographic characteristics of the basin and the nature of the spring thaw. It is based upon the utilization of various formula which by themselves are inadequate and which do not deal with the genesis of flood waters. *Subject Headings:* **1. Flood forecasting 2. Flood hydrographs 3. River discharge calculations.**—*I.L.D.*

10.7–271 551.579.5

*Blanc, Milton L. (*U. S. W. B., Wash., D. C.*), **How dry is dust?** *U. S. W. B., Weekly Weather and Crop Bulletin*, 44(21):8, May 27, **1957. DWB**—Data resulting from a series of soil moisture measurements made at the Univ. of Maryland tobacco farm in the summer of 1956 are presented to show moisture content of dust (A) at surface ¼″ of a fallow plot (B) ½ to 1″ below (A), and (C) surface ruts of a farm road. The measurements were made on the 9th day (Aug. 15) of no precipitation, when maximum temps. were in the upper 80's or low 90's (F). Wilting point was computed as 9.6%. Sample A gave 1.4% moisture or 0.27″/ft. Sample B gave 9.2% moisture or 1.77″/ft. Sample C gave 0.5% moisture or 0.10″/ft. *Subject Headings:* **1. Soil moisture data 2. Moisture content of dust 3. College Park, Md.**—*M.R.*

10.7–272 551.579.5:546.02:539.16/17

Eriksson, Erik (*Internat. Met. Inst., Stockholm*), **The possible use of tritium for estimating groundwater storage.** *Tellus*, Stockholm, 10(4):472–478, Nov. **1958.** 4 figs., 6 refs., 12 eqs. **DLC**—In view of a recent work by F. Begemann, and W. F. Libby, **Continental water balance, groundwater inventory and storage times, surface ocean mixing rates and world-wide water circulation patterns from cosmic-ray and bomb tritium** (*see Geochimica and Cosmochimica Acta*, 12:277–296, **1957**), their postulate on rapid mixing inside a ground water body is examined. It is found that there are no possible processes which can accomplish such a mixing. Their observations can, however, be readily explained from a simple model of ground water flow, assuming no mixing. Possible methods of using tracers like tritium for estimating ground water storage are also discussed. *Subject Headings:* **1. Ground water storage 2. Radioactive tracer techniques.**—*Author's abstract.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See also: **Climat. and met. texts** (Koeppe, De Long), 10.7–4; **Flood frequency and statistics of extremes** (Gumbel), 10.7–14; **Solar control and shading devices** (Olgyay, V. and A.), 10.7–18; **Climat. texts, U.S.S.R.** (Kostin), 10.7–20; **Review of climat., 1951–55** (Landsberg), 10.7–30; **Fluorescent tracers and uranine dye** (Robinson et al.), 10.7–130.

CLIMATIC ZONES

10.7–273 551.581(213)

Stamp, L. Dudley and Richards, P. W., **Climate, vegetation and land utilization in the humid tropics.** *Nature*, London, 181(4609):596–598, March **1958.** **DWB**—A summary of the papers on climate, vegetation and land utilization presented at Ninth Pacific Science Congress held at Bangkok, Thailand during Nov. 18–Dec. 9, 1957. Papers on the definition of tropical climates were presented by F. R. Fosberg and David I. Blumenstock who defined tropical climate as the region within which the temperature of the coldest month in the lowlands is at least 64°F (18°C) with the included upland and mountain areas. The importance of the radiation and illumination regime and significance of dew and rain variability are stressed. C. G. G. J. van Steenis proposed a system of ten fundamental climatic types of tropical lowland vegetation. Carl Troll proposed a system of six altitudinal zones of tropical mountain climates. Other papers dealt with tropical soils, land use mapping and ecology of man in the tropics. *Subject Headings:* **1. Tropical climates 2. Tropics.**—*I.L.D.*

CLIMATE OF PARTICULAR PLACES

See also: **Climate, Baraba lowland, U.S.S.R.** (Orlova), 10.7–22; **Climate, E. Siberia, U.S.S.R.** (Mirotvortsev), 10.7–24; **Climate, Bucegi, Romania** (Stoenescu), 10.7–37; **Climate, Golodnaya Steppe, U.S.S.R.** (Aizenshtat), 10.7–42; **Climatic atlas, Czechoslovakia,** 10.7–45; **Environmental handbooks for army training sites, Camp Hale and Pikes Peak, Colo.** (Thompson, Dodd), 10.7–49; **Climate, Sola Airport, Norway** (Knudsen), 10.7–107; **Station transfer, London** (Glasspoole), 10.7–140; **Physical geog., Korea** (Kőszegi, Kalas), 10.7–274; **Climate, Czechoslovakia** (Konček), 10.7–288.

10.7–274 551.4:551.582(519)

*Kőszegi, László and Kőszegi, Mária (Kalas), **Korea természeti földrajza.** [Physical geography of Korea.] *Földrajzi Közlemények*, Budapest, 81(5):45–60, **1957.** 8 figs., tables, refs.—A description of the location, surface features, geomorphology, climate, river system, flora, soil and fauna of Korea. The climatic elements discussed are annual and seasonal average temperature, circulation characteristics, humidity and total precipitation distribution. Charts showing mean temperatures for Jan. and July and average precipitation for the year, and tables listing extremes of average monthly temperature and precipitation for 11 stations are presented. *Subject Headings:* **1. Physical geography 2. Climate of Korea 3. Korea.**—*G.T.*

10.7–275 551.582(474.3)

Temnikova, N. S., **K voprosu o genezise klimata Latviiskoĭ SSR.** [The problem of climate formation in Latvia.] *Lietuvos T.S.R. Mokslų Akademija. Geologijos ir Geografijos Institutas, Mokslinial Pranešimai*, 5:89–113, **1957.** 22 figs., 10 tables. **DWB**—The author gives a broad analysis of the climate forming processes in Latvian S.S.R. and stresses the influence of local physico-geographic peculiarities upon the climate. The main climatic regions of the territory are outlined. *Subject Headings:* **1. Climate of Latvia 2. Latvian S.S.R.**—*Author's abstract.*

10.7–276 551.582.1(477.9)

Kumprechtová, J., **Klima severního a východního pobřeží Černého moře.** [Climate of the northern and eastern coasts of the Black Sea.] *Meteorologické Zprávy*, Prague, 10(3):83–85, **1957.** 3 photos, ref. **DWB**—Climatic characteristics of southern Crimea and the sea coast touching the northern Caucasus are described. A combination of marine and mountain

climates, and the presence of mineral waters make this area ideally suited for health resorts. *Subject Headings:* **1. Climate of southern Crimea 2. Crimea, Ukrainian S.S.R.**—*G.T.*

10.7–277 551.582.2(437):681.177

*Krečmer, Vladimír, **Nástin podnebí Nového Hradce Králové metodou komplexní klimatologie a s použitím statistických strojů.** [Outline of the climate of Nový Hradec Králové with the method of complex climatology using statistical machines.] *Meteorologické Zprávy*, Prague, 11(1):11–25, **1958.** fig., 14 tables, 8 refs. Czech, Russian and German summaries p. 11. **DWB**—Data for Nový Hradec Králové for the 20 yr period 1936–1955 have been analyzed by means of punched cards (sample card shown). After a detailed tabular presentation of monthly values of the various elements, the annual march of each of 23 weather types is shown in graphical and tabular form and discussed. The machine method is claimed to have reduced the time required for the study by 71%. The analysis was undertaken primarily as a background study for future micrometeorological studies. *Subject Headings:* **1. Climate of Nový Hradec Králové 2. Complex climatology 3. Machine methods in climatology 4. Nový Hradec Králové, Czechoslovakia.**—*G.T.*

CLIMATIC CHANGES

See also: **Glacier retreat, Novaya Zemlya, Soviet Arctic** (Kaplin), 10.7–60.

10.7–278 551.583:551.510.41:546.264

Revelle, Roger, **Sun, sea and air.** *Oceanus*, Woods Hole, Mass., 5(3/4):27–36, **1957.** photo. **DLC**—From earliest times to the present weather has been the concern of everyone. But the recent gains in the knowledge of the sun, sea and air and of man's dependence on physical forces, have tremendously extended his outlook on the activities of the meteorologists, oceanographers and of the allied physical scientists. This report discusses methods of understanding world climatic changes through a study of past changes around the globe. During the IGY the measuring of the carbon content of the atmosphere and estimating correctly the absorption of carbon dioxide in the sea will be undertaken. *Subject Headings:* **1. Climatic change theories 2. Carbon dioxide in the atmosphere 3. Carbon dioxide in oceans.**—*N.N.*

10.7–279 551.583

†Rutkovskaia, V. A., **Izmenenie klimata i klimaticheskie tendentsii.** [Climatic variations and climatic trends.] *Meteorologiia i Gidrologiia*, No. 10:59–63, Oct. **1956.** fig., 26 refs. **DWB, DLC.** Trans. into English available **DWB.** 10 p. fig., 4 refs. (in English). (M83.13 R9774ch)—A review of studies on climatic variations and climatic trends which appeared during 1953 and 1954. The studies include the following: changes in dates of break up and freezing of rivers, variations in the temperatures of oceanic waters, fluctuations in the area and thickness of Alpine glaciers and continental ice sheets, and variations in atmospheric temperature. A world map showing locations of stations where climatic variations were noted and the kind of variation is presented. *Subject Headings:* **1. Climatic variations 2. Climatic trends.**—*I.L.D.*

10.7–280 551.583.13(47

Lebedev, A. N. and Pisareva, G. P., **Klimaticheskie sezony SSSR.** [Climatic seasons of the U.S.S.R.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 62(124):67–84, **1956.** 10 figs., 4 tables, 12 refs. **DLC**—Despite the size of the U.S.S.R. and the diversity of climatic conditions, it is possible to distinguish 4 climatic seasons everywhere. Mean dates of the beginning and the average duration of the 4 seasons are presented by isograms on a series of schematic maps of the U.S.S.R. The basic criteria determining the character and duration of the seasons were: 1) for the beginning of spring—mean dates of air temperature transitions at 1 p.m. over 0°C; 2) for summer—mean last dates of an abrupt temperature increase; 3) for fall—beginning of an abrupt drop of temperature; 4) for winter—mean dates of first continuous frost onset. The maps show that the development of climatic seasons and their continuance is mainly determined by the latitude, conditions of the underlying surface, the proximity of seas, and the general character of circulation processes inherent in the given season. Several tables and graphs are included. *Subject Headings:* **1. Climatic seasons 2. Climate of U.S.S.R. 3. U.S.S.R.**—*A.M.P.*

10.7–281 551.583.14:551.590.21(52)

Yamamoto, T. (*Yamaguchi Univ., Japan*), **On the climatic change in Japan and its surroundings.** *Pacific Science Congress, 8th, Quezon City, Philippines, Nov. 1953, Proceedings,* Vol. IIA, pub. **1956.** p. 1113–1128. 6 figs., 4 tables, 4 refs. **DWB**—A physical explanation is given of the parallel relationships of the secular trends of such climatic elements in Japan as the reversed parallelism between summer and winter air temperature. The possible relationship between sunspots and climate during the past two centuries is investigated by using the precipitation records at Seoul, Korea. The 11 yr overlapping means were plotted for all climatic factors and sunspot numbers. The decade means of July pressure at Irkutsk were compared with those of July temperature at Nemuzo; Jan. temperatures in middle and southern Japan were compared with the Jan. pressure at Nemuzo; and contemporary correlation coefficients were computed between the Jan.–Feb. pressures of Polar regions of Asia and air temperatures in Central Siberia. The low state of sunspot activities was found to correspond to the intensified state of polar anticyclones in the Arctic regions of Asia and vice versa. *Subject Headings:* **1. Climate of Japan 2. Climatic changes 3. Sunspot effects on weather 4. Japan.**—*I.L.D.*

10.7–282 551.583.14(52)

Yamamoto, Takeo (*Yamaguchi University, Japan*), **On the climatic changes in Japan.** *Japan Academy, Tokyo, Proceedings,* 33(8):468–473, Oct. **1957.** 4 figs., table, 7 refs. **DWB, DLC**—Summer temp. in Japan shows a steady rising trend for the past 70 yrs of 0.014°C/year. Decadal differences from the secular curve for 1888–1957 are shown in a table (for both winter and summer). In winter it has been more rainy on the Pacific side and less snowy or rainy on the Japan Sea coast; in summer it has been cooler in northern Japan and more rainy in central Japan, as shown by 10 yr running mean curves. Comparison with far-away places such as Nova Scotia, Tibet, Lahore (Pakistan), etc. indicates role of the jet stream in parallelism in the former and reversal of trends in the case of Lahore-Japan curves. Correlations are not, however, perfect. *Subject Headings:* **1. Climatic trends in Japan 2. Japan 3. Lahore, Pakistan.**—*M.R.*

10.7–283 551.583.3:551.311.3(43,492)

†Dücker, Alfred and Maarleveld, Gerardus Cornelis, **Hoch- und spätglaziale äolische Sande in Nordwestdeutschland und in den Niederlanden.** [Middle and late glacial aeolian sands in N.W. Germany and the Netherlands.] *Geologisches Jahrbuch,* Hannover, 73:215–234, **1958.** 8 figs., 5 tables, 32 refs. **DWB**—Nature and extent of aeolian soil deposits in northwest Germany and the Netherlands are discussed in detail and illustrated. Three areas are given particular attention: Holland, Schleswig-Holstein and Niedersachsen. From the evidence, a description of the climate of the early, middle and late glacial epoch and of the post glacial cold period is constructed. It is concluded that ground was frozen and winds southwest with high sea level in early glacial; the climate was continental in northwest Europe with greatly lowered sea level in the period of increasing glaciation; anticyclonic and loess building climate at high or mid-glacial period; variable climate and rising sea level in the late glacial; and cold with heavy snow and frozen soil and southwest winds in the beginning of the preboreal era. *Subject Headings:* **1. Aeolian sand formation 2. Glacial climate 3. Northwest Germany 4. Netherlands.**—*M.R.*

MICROCLIMATOLOGY

See also: **Vineyard microclimat.** (Burckhardt), 10.7–115; **Microclimatic amelioration and influences** (Fournier d'Albe), 10.7–175; **Dobšina Ice Cave, Czechoslovakia** (Valovič), 10.7–233.

10.7–284 551.584:551.524.37:632.111(43)

†Yoshino, Masatoshi, **Microclimatological studies on frost damage distribution in Germany.** *Journal of Agricultural Meteorology,* Tokyo, 12(3):115–120, Jan. **1957.** 2 figs., table, 23 refs. In Japanese. **DWB**—Related German research organizations and researchers' activities are briefly reviewed. Discussions with actual case studies are given on frost investigation methods such as fixed points and moving observations, meteorological and plant phenomenon indications, direct surveys by individuals and scale model experiments, and

various charts related to frost such as charts of isothermal line, frost damage and degree of risk by frost. The scope of future studies related to frost damage is briefly summarized. *Subject Headings:* **1. Frost damage surveys 2. Microclimatological research 3. Germany.** —*Jay Woo.*

10.7–285 551.584.31:551.585.7(436)

Turner, Hans, **Maximaltemperaturen oberflächennaher Bodenschichten an der alpinen Waldgrenze.** [Maximum temperatures of the upper layers of soil at the Alpine timber line.] *Wetter und Leben*, Vienna, 10(1/2):1–12, Jan. **1958.** 5 figs., 4 tables, 20 refs. **DLC**—During a 12-day period of good weather that began June 27, 1957, the author investigated the temperatures of plants and the soil in different locations on the west-oriented slope of the Gurgler Valley at a height of 2070 m. The temperature of a cleared surface was measured with electric resistance thermometers which were cylindrically shaped (length 60 mm, diameter 10 mm). During the period June 27–July 8, 1957 the soil temperature at a depth of 1 cm showed mean values which exceeded by 27°C the air temperature measured in an instrument shelter at a height of 2 m; a maximum of 59°C (34.8°C above the air temperature) was reached. In contrast to the air temperature, the daily amplitude of the soil temperature increased from 30° to 48° during the period. At a depth of 1 cm, soil temperatures ran parallel to global radiation. Variations in wind velocities at height of 10 m from 6.4/met/sec to 13.1 met/sec did not influence soil surface temperature. With increasing depth, the warming up of the surface temperature rapidly decreases. In southern exposures the warming up of cleared ground during summer prevents the return of former vegetation. This is particularly true of SSW oriented surfaces. Numerical and graphical data are presented on the variation of the weather variables during the period June–July 1957, relationship between global radiation and soil temperature at 1 cm depth, maximum temperature rise and fall per min at 0.2–1.2 cm depth of the horizontal cleared surface, temperature at 1, 10, 20 and 100 cm depth of the surface, and air temperature at a height of 2 m, duration of maximum of soil temperature at 1 cm depth on bare surfaces with different exposures on July 5, 1957, etc. *Subject Headings:* **1. Mountain microclimatology 2. Plant temperatures 3. Soil temperatures 4. Air-Soil temperature differences 5. Gurgler Valley, Austria.**—*I.L.D.*

CLIMATIC CLASSIFICATIONS

See also: **Mt. Microclimatology, Gurgler Valley, Austria** (Turner), 10.7–285.

10.7–286 551.585:551.589

†Khromov, S. P., **Dinamicheskaia klimatologiia i problema klassifikatsii klimatov.** [Dynamic climatology and the problem of climatic classification.] (In: Vsesoiuznoe Geograficheskoe Obshchestvo S.S.S.R., **Voprosy Geografii.** Moscow, **1956.** p. 127–133. chart; 2 tables, 17 refs.) **DWB, DLC** (G58.G35)—Some general considerations and concrete results of the study of climate-forming factors. Much attention is given to B. P. Alisov's **Classification of climates of the earth** in which climates are subdivided in dependence on conditions of general circulation of the atmosphere, which is a decisive factor in the climate-forming process. H. Flohn's climatic classification published in 1950 is very similar to Alisov's. *Subject Headings:* **1. Dynamic climatology 2. Climatic classifications 3. Alisov's classification** —*A.M.P.*

10.7–287 551.585:551.589(497.2)

Kirov, K. T., **Prinos kŭm atmosferno-dinamichnoto klimatichno raĭonirane na Bulgariia** [Application of an atmospheric-dynamic climatic classification to Bulgaria.] *Khidrologiia Meteorologiia*, Sofia, 1:43–46, **1957.** fig., 13 refs.—Short article on adaptation of Alisov's ideas of classification of European climates to Bulgaria. North Bulgaria and central and south Bulgaria, divided by *Stara Planina*, are the two principal regions, corresponding to the "Continental European and Mediterranean" regions, respectively. In addition to these, there are sub-regions like the Black Sea area and the plateau region. *Subject Headings:* **1. Dynamic climatology 2. Alivov's classification 3. Climate of Bulgaria 4. Bulgaria.**—*G.T.*

10.7–288 551.585:551.582(437)

Konček, Míkuláš (*Czechoslovakia*), **Die Klimagebiete der Tschechoslowakei auf Grund natuerlicher Kriterien.** [Climatic regions of Czechoslovakia according to natural criteria.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 2, Phytological Bioclimatology), **1957.** 2 p. eq. **DWB**—On the basis of various sensitive criteria, Czechoslovakia is divided into three climatic regions, namely: warm, cold and transition region. The temperature indicators, which included the number of days with a maximum above 25°C, characterize the warm region, and the July isotherm of 15°C characterizes the cold region. The relationship of the individual regions to the soil moisture was determined by means of the moisture index measured by the formula $I_z = R/2 + A_r - 10t - (30 + v^2)$, where R—total precipitation amount during the growth period; A_r—positive deviation of the three winter months Dec.–Jan.–Feb. from 105 mm; t—mean temperature of the entire growth in °C, and v—mean wind speed at 14 o'clock in meters per second during the entire period, April–Sept.; $I_z < -20$ is dry; between -20 and 0, moderately dry; between 0 and 60 moderately humid; between 60 and 120 humid; above 120 very humid. The characteristics of the three climate regions are described. *Subject Headings:* **1. Moisture indexes 2. Climatic classification 3. Climate of Czechoslovakia 4. Czechoslovakia.**—*I.L.D.*

10.7–289 551.585.53:551.586:59

†Bodenheimer, F. S. (*Hebrew University, Jerusalem*), **Climatic factors in arid zone animal ecology.** *UNESCO Arid Zone Research*, No. 10:35–55, **1958.** 4 figs., 3 tables, 232 refs. **DWB, DLC**—The author discusses briefly the nature of ecology as a science, the complexity of the interrelationships between animals and weather, concepts of co-action, dominant paired weather factors and limiting factors in the environment, the roles of temperature, moisture and wind in animal ecology, and the nonrandom and arbitrary sequence of climate. This is followed by a detailed discussion of present knowledge of the role of weather in animal ecology and a review of the specific role of the ecological concepts, mentioned above, in the interaction of animals with weather and climate. This covers the bioclimatic zones of MERRIAM and GRINNELL; the bioclimatic zonation of Australia developed by DAVIDSON, based upon precipitation/evaporation ratio; the use of paired weather factors in animal ecology as illustrated by the work of W. C. COOK on the outbreak of Noctuid moths in Montana; the use of the climatogram in the study of the population of prairie chickens by SHELFORD, etc.; the correlation between metabolisms and body temperature of birds and weather; physiological regulation of birds vs. high, environmental temperatures in deserts, etc.; the significance of uni-directional and prolonged air mass movements upon outbreak history of insects, such as the effect of wind, temperature and rainfall upon locust outbreaks; and the ecological importance of microclimate as illustrated by the behavior of locusts and other insects, and by the microclimate of rodents in arid lands. *Subject Headings:* **1. Desert animal ecology 2. Arid zone ecology.**—*I.L.D.*

BIOCLIMATOLOGY

See also: **Med. met. symposia, Hamburg** (Undt), 10.7–67; **Bioclimat. conf.** (Undt), 10.7–68; **Weather influence on plant response to potash** (van der Paauw), 10.7–117; **Meteoropathology** (Zink), 10.7–125; **Cold eff. on man** (Iampietro et al.), 10.7–126; **Water temp. effect on polio** (Turner), 10.7–127; **Infrared radiation eff. on man** (Knepple), 10.7–128.

10.7–290 551.586:612.5

†Lee, Douglas H. K. (*Res. Branch, Office of Quartermaster-General, U. S. A.*), **Proprioclimates of man and domestic animals.** *UNESCO Arid Zone Research*, No. 10:102–125, **1958.** 5 figs., 9 tables, 41 refs., 9 eqs. **DWB, DLC**—Proprioclimate indicates those encompassing climatic conditions that affect the individual at any moment. In the light of this definition, the author reviews the physics of the thermal balance between warm blooded animals (including man) and the environment, and elaborates on the manner in which temperature, humidity, air movement and radiant energy enter into the thermal balance. In view of the complexity of the radiant energy exchange it is analyzed according to the following aspects: radiant energy exchange at uniform black body temperature or uniform surroundings, surroundings as to hemispheres, direct solar radiation and reflected solar radiation. Human responses to thermal

stress, including heat and cold, produced by various combinations of these climatic elements; the formulation and validity of an equation expressing physiological stress in terms of the physical thermal balance equation and the differences between animal and human responses to heat stress are discussed. The specific effects, in addition to thermal effects created by various climatic factors upon human and animal organisms, are summarized. These effects comprise the following: photochemical action of solar radiation, in particular that of ultraviolet radiation in the production of skin cancer, urticaria solare, etc.; of dust, precipitation and of barometric pressure. The time trend of responses of warm blooded animals to environmental changes which indicate yield and compensatory phenomena, the significance of internal conditions between successive responses to climate stress, and the influence of weather patterns are considered. The modification of the proprioclimate by clothing and shelter comprises the following topics: the action of clothing to modify conduction-convection, exchange, evaporation-convection loss and radiation exchange, metabolic effects of clothing; clothing design principles for hot dry conditions, the action of animal coats upon heat exchange; design principles for shelter and housing in cold climates, the solar radiation problem in hot dry conditions involving provision of minimum outer heating, control of heat flow through structure, removal of heat from inner surface and controlled ventilation in hot dry conditions. *Subject Headings:* **1. Proprioclimates 2. Physiological climatology 3. Thermal balance of human body.**—*I.L.D.*

ENVIRONMENTAL INFLUENCES

See also: **Spectral reflectivity of soils** (Andronikov), 10.7–211.

10.7–291 551.588.6:551.578.46(742)

Baldwin, Henry I. (*Research Forester, N. H. Forestry and Recreation Commission, Concord, N. H.*), **The effect of forest on snow cover.** *Eastern Snow Conference*, 1956 *and* 1957, *Proceedings*, Vol. 4:17–24, pub. **1957.** 2 figs., 2 tables, 42 refs. **DWB** (M06 E14p)—A discussion based on the literature and data collected at 50 stations in New Hampshire from 1937–1942 is presented. Snow is less subject to drifting, melts later, and evaporates less in forests than in the open. Accumulation, while less under tree crowns, is greater in openings because of protection from wind and sun, and is greatest in old forests of low density and in young stands with openings. Dense, stiff foliage intercepts more snow and retains it longer than long, flexible needles and branches. Tall trees with long crowns intercept a higher percentage of snow than flat crowns, the amount of interception varying with type of snowstorm and snow density. The density of snow decreases from a maximum in the open to a minimum in dense forests in proportion to stand density. Snow melting is retarded by forests by as much as 6 weeks as compared to the open, depending on forest density, the depth of crowns, and the abundance of advance reproduction. *Subject Headings:* **1. Forest influences on snow cover 2. Forest influences on snow melt 3. New Hampshire.**—*SIPRE abstract.*

DYNAMIC AND SYNOPTIC CLIMATOLOGY

See: **Cold pools, Rocky Mts.-Ural sector of N. Hemisphere** (Weimann), 10.7–31; **Dynamic climatology** (Khromov), 10.7–286; **Climate of Bulgaria** (Kirov), 10.7–287.

MISCELLANEOUS

COSMIC INFLUENCES

See: **Meteoric dust erosion of satellites** (Hoenig), 10.7–96; **Climate, Japan** (Yamamoto), 10.7–281.

VISIBILITY

10.7–292 551.591.2:551.576(545)

Ramamurthi, K. M. (*Met. Office, Poona*), **"Below Minima" conditions of weather over Palam, New Delhi and their simultaneity of occurrence at Safdarjung, New Delhi, Agra,**

Allahabad, Lucknow and Jodhpur. *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):37–46, Jan. **1959.** 4 tables, 5 refs. **DWB, DLC**—An analysis of the frequency and duration of spells of poor visibility and of low cloud ceiling over Palam, New Delhi, below certain specified limits has been presented using the data for the period 1949–53. "Below minima" conditions, prevailing simultaneously over the neighboring airfield at Safdarjung, are also presented. Simultaneity of weather conditions below specified limits over Agra, Allahabad, Lucknow and Jodhpur have also been studied with a view to assess their comparative suitability as alternates for Palam. It has been found that on occasions of poor visibility over Palam, Safdarjung too may be affected simultaneously on nearly 60% of the occasions. Agra is affected on 30% and Allahabad, Lucknow and Jodhpur on only less than 12% of the total number of occasions over Palam. Among these, Allahabad and Lucknow are more suitable as alternates for Palam during May and June while Jodhpur is better during the winter months. In regard to low clouds, Safdarjung is generally affected simultaneously with Palam on nearly 70% of the occasions. On occasions of "below minima" conditions of visibility or of low clouds or both over Palam, the suitability of aerodromes mentioned above as diversionaries stands in the following order of preference—(1) Jodhpur, (2) Lucknow, (3) Allahabad and (4) Agra. *Subject Headings:* **1. Poor visibility statistics 2. Low cloud frequency analysis 3. India.**—*Author's abstract.*

OPTICAL PHENOMENA

See also: **Optics of aerosols** (Shifrin), 10.7–13.

10.7–293 551.593.53

de Bary, E. and Bullrich, K. (*Met.-Geophysikalisches Inst. der Johannes Gutenberg Univ. Mainz*), **Himmelsfarbe in Sonnennähe.** [Color of the sky near the sun.] *Geofisica Pura e Applicata*, Milan, 41:141–158, **1958.** 17 figs., 3 tables, 8 refs., 12 eqs. German, English and French summaries p. 141–142. **DLC**—Regarding the sky near the sun, a bright white disk reaching from 0 to ca. 30° sun distance is remarkable. The area of the disk varies with the degree of turbidity of the atmosphere and with the sun's altitude. Using basic theoretical results published in a former paper (*see* 4.11–5, Nov. 1953, *MAB*) this phenomenon was investigated and numerically evaluated. For several of the sun's circumhorizontal arcs and several turbidities, color, saturation and brightness of the sky were computed. At small sun's altitudes near the horizon, the effect of color is disturbed. In this case, points for the calculations were elected, being in sun's vertical above the sun. Degrees of turbidity $c=4$, 8 and $20\cdot10^{-12}$ and refractive number 1.5 were used. Color variation at the edge of the disk is clearly seen. Furthermore, the color of the sky near the sun has been calculated for another aerosol distribution. *Subject Heading:* **1. Sky light color.**—*Authors' summary.*

ELECTRICAL PHENOMENA

See also: **Potential grad. meters and double field mill** (Chalmers, Smiddy), 10.7–154; **Troposphere-ionosphere relationships** (Bauer), 10.7–185.

10.7–294 551.594.1/2

Kraakevik, J. H. and Clark, John F., **Airborne measurements of atmospheric electricity.** *American Geophysical Union, Transactions*, 39(5):827–834, Oct. **1958.** 7 figs., 17 refs., 8 eqs. **DWB, DLC**—An experimental investigation of the variations of atmospheric electric quantities in space and time was conducted. A review of past measurements reveals several inaccuracies and inconsistencies which stimulated the investigation. The simultaneous measurement of both polar conductivities, of potential gradient, and of several meteorological quantities from a multi-engine airplane, and the derivation of other atmospheric electric variables, are described. Altitude "profiles' of conductivity and potential gradient up to 6 km obtained on a representative sounding over the Chesapeake Bay show a secondary exchange layer above the more common surface exchange layer. The space-charge density profile exhibits positive charge concentrations at the tops of these layers, near the bases of the associated temperature inversions. Upward convection of positive space charge causes the computed conduction-current

density within the exchange layers to be some 40% higher than its relatively constant value above the layers. The product of columnar resistance and current density, employed by previous workers to obtain atmospheric potential, provides erroneous values—whether the conduction current near the earth's surface or the average value over the entire altitude range is used. On the basis of a 6-km atmospheric potential of 327 kv obtained from the integrated potential gradient, the true extrapolated total potential of the high atmosphere is 341 kv at a time near the diurnal maximum. *Subject Headings:* **1. Air-borne atmospheric electricity measurements 2. Atmospheric electricity measurements 3. Atmospheric potential gradient 4. Space-charge density profiles.**—*Authors' abstract.*

10.7–295 551.594.11:551.594.252

Adkins, C. J. (*Cavendish Lab., Cambridge*), **Measurements of the atmospheric potential gradient on a Canadian glacier.** *Royal Meteorological Society, Quarterly Journal*, 85(363):60–64, Jan. **1959.** 5 figs., 17 refs. **DWB, DLC**—Measurements of the atmospheric potential gradient made on a glacier at an alt. of 1700 m showed a behavior considerably simpler than is normally found near the ground. The nearness of the cloud, and the absence of point discharge for some kilometres gave a clear-cut distinction between snow and rain, these almost always being associated with positive and negative fields, respectively. The results suggest that the electrification processes are associated with the precipitation in both cases, and that marked electrical effects accompany the melting of snow. *Subject Headings:* **1. Atmospheric potential gradient measurements 2. Electricity of precipitation.**—*Author's summary.*

10.7–296 551.594.11:551.594.13:551.508.822

Lugeon, Jean (Zurich), **Mesures du gradient de potential électrique et de la conductibilité de l'air par radiosonde.** [Measurement of potential electric gradient and atmospheric conductivity by means of radiosonde.] *Schweizerische Naturforschende Gesellschaft, Verhandlungen*, 136:91–92, **1956.**—The apparatus for measuring atmospheric potential gradient and atmospheric conductivity consists of two radioactive equalizers at a vertical distance of 2 or 3 m, and control on electronic lamp, which is connected to a transmission tube and transmits to the ground on a wave carrying an oscillation varying from about 100 to 1000 Hertz for a difference of electrostatic potential of 0–500 V/m. The oscillation is rectified by a special amplifier and directly controls a recording device. Conductivity is measured with a Gerdien condensor with a capacity of several centimeters. The central electrode is charged at a potential of 100 volts every two or three min by a Königsfeld clock. Gradient measurements made from 1954 to 1956 up to about an alt. of 20 km indicate a progression as the sonde rises. At 10 km one finds 10 V/m; at 20 km, 5 V/m when beginning with 100 V/m at the ground in calm weather. *Subject Headings:* **1. Atmospheric potential gradient measurement 2. Atmospheric conductivity 3. Radiosondes.**—*I.L.D.*

10.7–297 551.594.12:551.510.535

Bhargava, B. N. (*Kodaikanal Obs., Kodaikanal*), **Annual wave in the world-wide F-region ionization.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):69–72, Jan. **1959.** 2 figs., 2 tables, 2 refs. **DWB, DLC**—An analysis of squares of noon median F2 layer critical frequencies for a 3-yr period has been made in order to derive the latitude variation of the annual effect in the electron densities and its relation to average F2 layer ionization. The results indicate that the annual component R_1 varies with the latitude in a manner very nearly similar to that of the steady ionization R_0 and that for a given value of R_0 for any latitude, R_1 can be derived approximately from a linear relationship of the type $R_1 = 0.3\ R_0 - 4.5$. A similar analysis of 9-yr data for precise phase and amplitude of the annual component for a pair of stations yields a value of R_1, which is of the same order of magnitude as R_0 and which attains a maximum around the epoch of minimum sun-earth distance. *Subject Headings:* **1. F2 layer ionization variations 2. F2 layer critical frequencies.**—*Author's abstract.*

10.7–298 551.594.25:551.510.42(52)

Hatakeyama, H. (*Met. Res. Inst., Tokyo*), **On the disturbance of the atmospheric electric field caused by the smoke-cloud of the volcano Asama-yama.** *Papers in Meteorology and Geophysics*, Tokyo, 8(4):302–316, Jan. **1958.** 10 figs., table, 8 refs., 4 eqs. **DWB**—The

disturbance of the atmospheric electric field caused by the smoke-cloud of the Volcano Asama-yama was observed at Karuisawa Weather Station (about 9 km from the crater), Maebashi Weather Station (about 50 km from the crater) and several other temporary stations around Maebashi. At Karuisawa the disturbance of the electric field was composed, earlier, of a small positive and, later, of a large negative one, but at Maebashi the disturbance was mainly in a negative field. In the smoke-cloud, the screening of ash grains with respect to height is performed by the action of gravity. Smaller ash granules have a positive electric charge and exist in the upper part of the smoke-cloud, and larger ash grains have a negative electric charge and exist in the lower part of the cloud. Laboratory experiments on the electrification of volcanic ashes were made and it was confirmed that larger ash grains obtain a negative electric charge and smaller ash granules obtain a positive charge after mutual collision. Two hypotheses were proposed to explain the fact that near the crater the effect of both positive and negative charges is observed, but far from it only the effect of the negative charge is observable. *Subject Headings:* **1. Atmospheric electricity disturbances by smoke 2. Asama-yama volcano, Japan.**—*Author's abstract.*

10.7–299 551.594.21

Chalmers, J. Alan (*Univ. of Durham, Eng.*), **Modern theories of thunderstorm electrification.** *Geofisica Pura e Applicata*, Milan, 41:189–193, **1958.** refs. **DLC**—Some modern theories of thunderstorm electrification, particularly that of VONNEGUT (1955, *see* 9.2–272, Feb. 1958, *MAB*),] are critically compared with older theories and suggestions put forward which might allow decisive observations to be made. *Subject Heading:* **1. Thunderstorm electricity theories.**—*Author's summary.*

10.7–300 551.594.221:550.37

Fritsch, Volker (*Versuchsanstalt für Geoelektrik und Blitzschutz, Vienna*), **Der Einfluss der geoelektrischen Bodeninhomogenität auf die Blitzgefährdung.** [Effect of geoelectric ground inhomogeneities upon lightning hazard.] *Geofisica Pura e Applicata*, Milan, 41:125–132, **1958.** 2 figs., 3 tables, 8 refs. German and English summaries p. 125. **DLC**—Austrian statistics show that the places struck by lightning are distributed irregularly over the country. They were observed most frequently in areas of inhomogeneous ground. Laboratory experiments showed the same effect. The author develops a hypothesis for the explanation of this phenomenon. *Subject Heading:* **1. Geoelectric lightning "nests."**—*Author's summary.*

AURORAS

10.7–301 551.594.5:550.388

Barbier, Daniel, **L'activité aurorale aux basses latitudes.** [The auroral activity at low latitudes.] *Annales de Géophysique*, Paris, 14(3):334–355, July/Sept. **1958.** 12 figs., 4 tables, 9 refs. **DLC**—Instrumentation and observations particularly concerning radiation [O I] 6300. In addition, it includes a list of auroras detected at the Observatory of Haute-Provence between March 7, 1956 and Oct. 3, 1957; distinction between active auroras and quiescent auroras; a phenomenon not described previously: the monochromatic auroral arc 6300 Å; relations between auroras and magnetic activity; frequency of the auroral activity; radiation other than [O I] 6300; and auroras at low latitudes lighted by the sun [such an aurora has been observed at Tamanrasset (lat. 22°47′)]. An abnormal phenomenon (auroral?) was observed on Jan. 28, 1957 at the Observatory of Haute-Provence. *Subject Headings:* **1. Low latitude auroras 2. Magnetic effects on low latitude auroras.**—*Author's abstract.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON PROPAGATION OF ACOUSTIC AND EXPLOSION WAVES IN THE ATMOSPHERE SUPPLEMENT—1959

By: *Geza Thuronyi*

EXPLANATORY NOTE

It is the purpose of this compilation to bring up to date a bibliography on acoustic propagation, published in *Meteorological Abstracts and Bibliography*, 1 (10):670–686, Oct. **1950.** Consequently, the bulk of the material referred to here is literature published during the period 1950–1959. However, a few items dated earlier than 1950, and not included in the 1950 bibliography, are being added.

The emphasis, as originally, is on papers dealing with the propagation of acoustic waves as applied to the study of various properties of the atmosphere.

Items are arranged chronologically by year and alphabetically within each year. The following outline of contents indicates the scope of the subject matter in this supplement.

This bibliography was prepared for and with support from the U. S. Army, Signal Missile Support Agency, White Sands Missile Range, New Mexico.

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1937–1949

10G–1 551.596.1

†Miller, Dayton Clarence (*Case School of Applied Science*), **Sound waves; their shape and speed.** New York, Macmillan, **1937.** 164 p. 64 figs., 5 tables, 51 refs. **DLC** (QC243 & M55)—This description of the phonodeik (an apparatus for photographic recording of sound waves) and its application includes a report on experiments made at Sandy Hook (1918–1919) on acoustical phenomena associated with the firing of large guns (p. 91–155). Some results are presented in graphical and tubular form on: 1) pressure effects in the air near large guns during firing; 2) wave forms of the sounds; 3) propagation of sound waves from the muzzle of a gun and 4) normal velocity of sound in free air. *Subject Headings:* **1. Explosion waves 2. Acoustical propagation 3. Sound wave forms.** —*G.T.*

10G–2 551.551:551.596.1

Krasil'nikov, V. A., **O rasprostranenii zvuka v turbulentnoĭ atmosfere.** [On the propagation of sound in a turbulent atmosphere.] *Akademiia Nauk, SSSR, Doklady,* 47(7):486–489, **1945.** 5 refs., 4 eqs. **English version** in *Akademiia Nauk SSSR, Comptes Rendus,* 47(7):469–471, **1945.** 5 refs., 4 eqs. **DLC**—An attempt to explain on the basis of statistical theory of turbulence, experimental results on fluctuations of the phase of sound waves in a turbulent atmosphere. Formulas based on KRASIL'NIKOV (1945), KOLMOGOROV (1941), OBUKHOV (1941) and empirical data of GODECKE (1935) and FINDEISEN (1936), show dependence on speed of wind and on the $\frac{2}{3}$ law of Kolmogorov. (*Same item as* 4B–133, Feb. 1953, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Turbulence effects on sound.**—*M.R.*

10G–3 551.501:551.596.1

Gandin, L. S., **Prilozhenie teorii trekhbazisnykh nabliudeniĭ k zadache artilleriĭskoĭ zvukovoĭ razvedki.** [Application of theory of observations from three points to the problem of acoustical artillery reconnaissance.] *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, Trudy Nauchno-issledovatel'skikh Uchrezhdeniĭ, Ser. 1, Meteorologiia,* No. 34:25–33, **1946.** 5 figs., table, 5 refs., 7 eqs. **DLC**—The conditions for more effective construction of nonalignment triangles are analyzed and the dependence of the accuracy on distance, length of base and other factors are discussed. (*Same item as* 5.7–34, July 1954, *MAB.*) *Subject Headings:* **1. Triangulation 2. Acoustical propagation 3. Military meteorology.**—*N. T. Zikeev.*

10G–4 551.593:551.591.1:551.596.1

Schmauss, A., **Sichtbare Druckwellen.** [Visible pressure waves.] *Zeitschrift für Meteorologie,* 1(1):2–14, **1946. DWB**—Pressure and sound waves visible in the sky as bright and dark rings and stripes, were observed in Germany during the First World War, and again in 1942–3–4. The waves originated in artillery, flak, incendiary bombs and other explosions. A number of accounts of actual cases of this kind observed by meteorologists, together with the accompanying meteorological conditions, are cited for each type of disturbance which would produce pressure waves, including accounts of pressure waves from planes in flight. The thermodynamic theory, the optical theory, the method of formation of the clouds which accompany the waves and the oscillations of ice crystals, etc. in the field of gravity are considered. The presence of clouds is not necessary, but increases the possibility of viewing the phenomenon. (*Same item as* 1–159, Jan. 1950, *MAB.*) *Subject Headings:* **1. Optical phenomena 2. Acoustical phenomena 3. Visibility.**

10G–5 551.596.1:551.571

Arabadzhi, V. I., **O pogloshchenii akusticheskikh kolebaniĭ vo vlazhnom vozdukhe i tumane.** [Absorption of acoustic waves in humid air and fog.] *Meteorologiia i Gidrologiia,* No. 3:11–18, **1947.** table, 12 eqs. **DWB**—The paper contains a survey of the present state of knowledge of the theory of absorption of sound waves in clouds and fog. Size of water drops in the atmosphere, frequency of sound waves being propagated and chemical composition, as well as sound and zones of silence are discussed. (*Same item as* 2.9–180, Sept. 1951, *MAB.*) *Subject Headings:* **1. Sound propagation 2. Humidity effects.**—*C.K.*

10G–6 551.596.1:551.510.41:546.264

Abbey, R. L. and Barlow, G. E., **The velocity of sound in gases.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences,* 1(2):175–189, June **1948.** 7 figs., 5 tables, 20 refs., 3 eqs. **DWB**—Carefully conducted laboratory measurements of sound speed were made in gases at pressures from one atmosphere down to 5 mm (air, nitrogen, oxygen, carbon dioxide and methane). Theory, instrumentation, tube correction and results discussed and illustrated by diagrams, charts and tables. (*Same item as* 2.3–177, March 1951, *MAB.*) *Subject Headings:* **1. Sound velocity 2. Carbon dioxide.**—*M.R.*

10G–7 551.596.1:534.22

Hixson, E. L.; Gerhardt, J. R. and Straiton, A. W., **A device for continuous and instantaneous measurement of the velocity of sound over considerable distances.** Texas. University. Electrical Engineering Research Laboratory, Contract N6onr-266, Task Order 2, Report No. 21, Nov. 1, **1948.** 15 p. 2 tables, 4 figs., 13 eqs. **DWB**—An instrument developed for measuring sound propagation velocity, by introducing impulses created in a speaker and in a microphone into an oscilloscope is described and presented on schematic drawings. Measurements using a sound pulse frequency of 1000 cycles/sec and a repetition rate of 10 cycles/sec are reported and their results presented in terms of temperature and wind velocity components. (*Same item as* 4.6–252, June 1953, *MAB.*) *Subject Headings:* **1. Sound velocity measurement 2. Acoustical propagation.**—*G.T.*

10G–8 551.596.5:534.22

Fleagle, Robert G., **The audibility of thunder.** *Acoustical Society of America, Journal,* 21(4): 411–412, July **1949.** 5 refs., 13 eqs. Reprint available. **DLC**—Thunder is rarely heard at a distance of more than 25 km. Author calculates paths of sound waves tangent to earth for various lapse rates and wind shears. These are approximately parabolas. With a lapse of 7½°C/km and small shear, thunder at a height of 4 km would be inaudible beyond 25 km. Shear would probably reduce this. (*Same item as* 2.9–183, Sept. 1951, *MAB.*) *Subject Headings:* **1. Acoustical phenomena 2. Audibility of thunder.**—*C.E.P.B.*

10G–9 551.510.53:551.596.1

Regula, Herbert, **Erforschung der Hochstratosphäre durch Schallwellen.** [Investigation of the high stratosphere by explosion waves.] *Meteorologische Rundschau,* 2(9–10):263–267, Sept.–Oct. **1949.** 5 figs. **DWB**—Zones of silence and abnormal audibility of explosions point to a strong inversion at 35 to 40 km. This is confirmed by V-2 ascents. The location of zones of audibility exceeding 150 km, mainly to west in summer and east in winter, agrees with summer and winter winds according to SCHERHAG (1948) from topography of 41 mb surface (ca. 22 km), which are therefore considered to represent whole layer 20–45 km. Further experiments should bring temperatures and winds up to 45 km into discussion of synoptic problems. (*Same item as* 4–40, April 1950, *MAB.*) *Subject Headings:* **1. Structure of the stratosphere 2. Acoustical phenomena 3. Audibility zones.**—*C.E.P.B.*

1950

10G–10 551.510.53:551.557

California. University at Los Angeles. Institute of Geophysics, **Survey of data and theoretical analysis of the upper atmosphere.** Contract Cwb 7904, Final Report, June **1950.** Pt. I–IV. 4 pieces. figs., plates, tables, refs., eqs. **DLC, DWB**—Report divided into four parts. First gives methods and results of upper atmosphere research. Stratosphere winds observed at varying heights by gun shells, rockets, and noctilucent clouds and derived from propagation of sound and radio waves and meteors. Pt. II on turbulence in the upper stratosphere gives evidence of convection currents between 50 and 80 km (*same item as* 3K–206, Nov. 1952, *MAB*). Pt. III proposes a tentative model of stratospheric circulation up to 120 km. Pt. IV discusses the atmosphere above 100 km. (*Same item as* 4F–52, June 1953, *MAB.*) *Subject Headings:* **1. Stratospheric research 2. Stratospheric winds. I. U. S. Weather Bureau II. Kellogg, William W. III. Schilling, G. F.**—*G. J. Evans.*

10G–11 551.596.9

Cave, C. J. P., **The Barisal guns.** *Weather,* 5(4):149, April **1950. Comments** [by] W. Hayes and J. Wadsworth. *Ibid.,* 5(8):293, Aug. **1950.** Also: **Comments** [by] Chiplonkar, M. W. [and] Wooldridge, G. C. *Ibid.,* 5(12):425, Dec. **1950. DWB**—Correspondence initiated by C. J. P. CAVE about unexplained booming noises in hot, still weather, known in Ganges delta as "Barisal guns." Also known in Australia as "Hanley's guns." In the second article, further letters about subject are discussed in Weather for April and Aug. 1950. CHIPLONKAR attributes phenomena to subterranean noises transmitted through the stratosphere. (*Same item as* 5.3–327, March 1954 and 2.3–178, March 1951, *MAB.*) *Subject Headings:* **1. Brontides 2. Acoustical phenomena 3. India.**—*C.E.P.B.*

10G–12 551.596.1:551.524.7

Haskell, Norman A., **Diffraction effects in the propagation of compressional waves in the atmosphere.** *U. S. Air Force Cambridge Research Laboratories, Geophysical Research Papers,* No. 3, March **1950.** 43 p. 13 figs., 2 tables, 9 refs., 10 eqs. **DWB**—An attempt is made to solve the acoustic wave equation asymptotically, for the case where the velocity of propagation depends only on altitude and there is only one minimum value. This approximate solution is applied to the problem of estimating the temperature at 25 to 60 km on time of travel for acoustic waves from

large explosions to zones of abnormal audibility. The methods, with slight modification, can be equally well applied to problems of long distance, transmission of sound in the ocean, or to particular types of seismic waves. Emphasis is placed on diffraction effect on range and frequency, and useful tables and graphs are included. (*Same item as* 7–135, July 1950, *MAB.*) *Subject Headings:* **1. Acoustical phenomena 2. Audibility zones 3. Upper air temperatures.**—*M.R.*

10G–13 551.510.53:551.596.1(54)

Mathur, L. S., **Reflection of sound waves from the stratosphere over India in different seasons of the year.** *Indian Journal of Meteorology and Geophysics*, 1(1):24–34, Jan. **1950.** 7 figs., 3 plates, 2 tables, 3 refs. **DWB**—Three series of observations were made in India during the summer, fall and winter of 1946–1947 to determine the trajectories of sound waves (from explosions) through the stratosphere. Two explosion centers and nine recording stations (in the form of a cross with the axis along the line joining the two centers) were set up by the Meteorological Department, and their locations shown on a chart. Actual recorder records for ground waves and reflected waves are reproduced, and derived data presented in tables and graphs. In the summer better reception was obtained toward the south, whereas, after the monsoon season, and in the winter better records were obtained to the north (up to 294 kms) of the explosions. Records of the ground wave were obtained even in the "zone of silence." Trajectories are illustrated and temperatures and lapse rates in the stratosphere computed and plotted. (*Same item as* 5–121, May 1950, *MAB.*) *Subject Headings:* **1. Sound wave 2. Acoustical phenomena 3. Stratosphere 4. India.**—*M.R.*

10G–14 551.596.1:551.578.46

Ooura, Hirobumi, **Reflection of sound at snow surface.** *Snow and Ice.* (*Seppyo*), Tokyo, 12(3):273–275, **1950.** table, diagr., eqs. In Japanese. **DWB**—The reflections of sound at the snow surface were observed with the method of standing wave. If the amplitude of incident wave is a, and that of reflected wave is b, then the maximum amplitude of standing wave is $a+b$, and the minimum is $a-b$. These values were measured with the carbon microphone and the Brown tube. From these values the rate of absorption $A=(a^2-b^2)/a^2$ was calculated. The results are shown in tables. From these results the following are known: 1) the rate of absorption A is considerably large; 2) the smaller the density, the larger the absorption; 3) for settled snow, the higher the frequency of sound, the larger the absorption; and 4) for settled snow, when the snow was warmed and wetted, the absorption increased. (*Same item as* 6.11–362, Nov. 1955, *MAB.*) *Subject Headings:* **1. Sound absorption 2. Snow cover effects on sound.**—*Author's abstract.*

10G–15 551.510.5:551.511:551.524.7:532.596

Pekeris, C. L. (*Inst. for Adv. Study, Princeton, N. J.*), **Free oscillations of an atmosphere in which temperature increases linearly with height.** *U. S. NACA, Technical Note*, 2209, Oct. **1950.** 26 p. 3 diagrs., 10 refs., eqs. Mimeo. **DWB**—In an atmosphere where the temperature increases linearly with height at a constant rate, the acoustic propagation properties are radically different from those hitherto encountered in the theory of atmospheric tides. The phase velocity no longer approaches a limit with increasing period but increases linearly with the period. The region of maximum energy of the oscillation is shifted to increasingly higher elevations as the period is increased. The bearing of these results on the resonance theory of atmospheric tides is discussed. (*Same item as* 3.10–95, Oct. 1952, *MAB.*) *Subject Headings:* **1. Atmospheric oscillations 2. Upper air temperatures 3. Acoustical propagation. I. U. S. NACA.**—*Author's abstract.*

10G–16 551.596.1:551.510.522

Pennsylvania. State College, Dept. of Physics, Acoustics Lab., **Atmospheric physics and sound.** Contract W36-039-sc-32001; Project DA 3-99-04-022, Final Report July 1, 1945—May 20, **1950.** 288 p. numerous figs., foot-refs. **DLC**—This voluminous report contains a detailed account of the instrumentation developed, methods used and results achieved at Pennsylvania State College in a five-year study aimed at investigating the production and propagation of sound, both sonic and ultrasonic, in the lower atmosphere, through the ground, and in other media. Ch. 7 (p. 178–186), **Micrometeorology and atmospheric acoustics** is a summary of results of temperature and wind velocity measurements (mostly with hot wire thermometers and anemometers) made up to 50 ft from the ground in conjunction with sound intensity measurements. A definite correlation is found between sound signal fluctuations and inhomogeneities of temperature, but not of wind. Likewise no effect of snow cover on sound propagation was noted. *Subject Headings:* **1. Acoustical propagation in lower atmosphere 2. Micrometeorological effects on sound.**—*G.T.*

10G–17 551.551.21:551.596.1

Richardson, E. G., **The fine structure of atmospheric turbulence in relation to the propagation of sound over the ground.** *Royal Society of London, Proceedings, Ser. A*, 203(1073):149–164, Sept. 22, **1950.** 8 figs., 2 plates, 4 tables, 18 refs. **DLC**—With the aid of hot-wire instruments, measure

ments have been made of the fluctuations of the wind in the lowest 50 ft of the atmosphere and, in particular, of the mean eddy diameter and of the ratio of vertical and cross-wind components in such fluctuations. It appears that the turbulent elements near the ground are smaller in size and more nearly isotropic in character than those higher up. Some correlation between the temperature and velocity fluctuations near the ground has been observed. Simultaneous measurements of the fluctuations in sound intensity at a distance from a steady source and of the intervening gustiness have been made in order to discuss the relation between sound scattering and background noise, on the one hand, and the intensity and scale of the prevailing turbulence on the other. The effect of the latter on the phase relationships between the signals picked up at two points is also demonstrated. (*Same item as* 6.1-204, Jan. 1955, *MAB.*) *Subject Headings:* **1. Atmospheric turbulence 2. Acoustical propagation.**—*Author's abstract.*

10G-18 551.596:534(02)

*†Trendelenburg, Ferdinand, **Einführung in die Akustik.** [Introduction to acoustics.] 2nd ed. Berlin, Springer-Verlag, **1950.** 378 p. 280 figs., 28 tables, numerous refs., equations, append. **DLC** (QC225.T58)—A modern and highly technical text on acoustics with great emphasis on the theory of wave propagation in various media. In Chap. 11, variations of wave form and speed with changes in temperature and pressure are taken up. In Ch. IV, Par. 22 deals with the influence of atmospheric temperature and wind lapse rate or discontinuities on propagation and refraction of sound waves, anomalous zones of audibility and stratospheric reflection. The text is amply illustrated with schematic diagrams, graphs and photographs. *Subject Headings:* **1. Acoustics textbooks 2. Wave propagation.**—*M.R.*

10G-19 551.596.1 551.46

Veldkamp, J., **Geluidvoortplanting in oceaan en atmosfeer.** [Acoustical propagation in the ocean and atmosphere.] *Nederlands Tijdschrift voor Natuurkunde,* 16(11):281–289, Nov. **1950.** 6 figs., 4 refs., eqs. **DLC**—Charts showing possible sound trajectories in the sea and atmosphere with varying density conditions should prove useful for calculations of sound propagation. Data on propagation in the atmosphere, based on the Oldebroek (1932) and Helgoland (1947) explosion observations, are used to calculate temperatures in the stratosphere and anomalous paths and times of travel. (*Same item as* 2.6-155, June 1951, *MAB.*) *Subject Headings:* **1. Anomalous sound propagation 2. Oceanography 3. Acoustical sounding.**—*M.R.*

1951

10G-20 551.596.1:550.34

Benioff, Hugo; Ewing, Maurice and Press, Frank, **Notes on sound waves in the atmosphere generated by a small earthquake.** California Institute of Technology, Seismological Laboratory and Columbia University, Lamont Geological Observatory, Contract AF 19(122)-436 and AF 19(122)-441, Technical Report, 12, May, **1951.** 7 p. graphs, 7 refs., eqs. **DWB**—Sound waves from the Imperial Valley earthquake of 24 Jan. 1951 are interpreted as the result of coupling between Rayleigh waves crossing the valley and the atmosphere. An order of magnitude calculation, based on the theory of air coupled Rayleigh waves, satisfactorily explains the duration, travel time, period and path of the sounds. *Subject Headings:* **1. Acoustical propagation 2. Air coupled waves 3. Earthquakes 4. Imperial Valley, Calif. I. California Institute of Technology. Seismological Laboratory II. Columbia University. Lamont Geological Observatory III. Contract AF 19(122)-436 IV. Contract AF 19(122)-441.**—*Authors' abstract.*

10G-21 551.596.1:551.510.5

Eckart, G., **Charactéristiques acoustiques de l'atmosphère.** [Acoustical characteristics of the atmosphere.] *Recherche Aéronautique,* Paris, No. 21:59–66, May/June, **1951.** graphs, tables, refs. **DLC**—The theoretical and empirical properties of the atmosphere are defined quantitatively and application given to the propagation and absorption of sound waves travelling in an atmosphere with varying temperature and humidity. Several "standard atmospheres" including the NACA or "American" model are presented. Tables and graphs for computation are also given. Comparison is made between electromagnetic and acoustical propagation and damping. (*Same item as* 3.8-228, Aug. 1952, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Atmospheric structure.** —*M.R.*

10G-22 551.596.1:551.510.62

Ellison, T. H., **The propagation of sound waves through a medium with very small random variations in refractive index.** *Journal of Atmospheric and Terrestrial Physics,* 2(1):14–21, **1951.** 11 refs., 31 eqs. **DWB**—A theoretical study of scattering in a field of known, slightly variable refractive index such as the atmosphere, first of an incident plane wave and secondly of a ray. It is

found that "for a wave travelling in a statistically homogeneous medium where the scale of the variations in refractive index is suitably large compared with the wave length but small compared with the path length, the variations in intensity produced by the medium are proportional to the cube of the path length for short paths, but directly proportional to it for long paths." (*Same item as* 3.8–229, Aug. 1952, *MAB.*) *Subject Heading:* **1. Acoustical propagation.**—*From author's abstract.*

10G–23 551.596.1:551.571.3

Gopalji, —, **Ultrasonic absorption of normal air at 456 Kc/s for different humidities.** *Indian Journal of Physics*, 25(6):298–304, June **1951.** 7 figs., table, 6 refs., 15 eqs. **DLC**—The simplified treatment of the ultrasonic formula

$$\mu = \frac{2.303\,[\log_{10}\Delta\theta_A - \log_{10}\Delta\theta_B]}{n_B - n_A}$$

is demonstrated (at 455.8 Kc/s) in the case of a mixture of nitrogen, oxygen and carbon dioxide in normal air proportions with varying water content. (*Same item as* 4.5–242, May 1953, *MAB.*) *Subject Headings:* **1. Ultrasonics 2. Humidity variations.**—*W.N.*

10G–24 551.596.1:551.508.43

†Gutenberg, B., **Sound propagation in the atmosphere.** (In: **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 366–375. 14 figs., table, 30 refs., 34 eqs.) **DWB**—The theory of sound waves in gases, the equations for velocity of sound in quiet and in moving air and the energy of sound waves in the atmosphere are first considered in detail. Then instruments for recording sound waves (microbarographs) and their limitations are discussed. Observations and records from microbarographs of sound propagation through the troposphere and the stratosphere, and abnormal audibility zones are treated in the last part of this paper. Numerous illustrations are presented to show types of records, areas of abnormal audibility from explosions (Germany, 1925 and Vergiate, Italy, Nov. 1920), travel time curves from explosions, cross sections showing typical paths of sound waves, and temperature and sound velocity profiles from V-2 flights and sound propagation data. Problems of wind effect and of natural pressure waves in atmosphere are among the most important for future study. (*Same item as* 4.3–5, March 1953, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Microbarographs 3. Explosion waves 4. Compendium articles.**—*M.R.*

10G–25 551.596.5(691)

Poisson, R. P., **Sur l'audibilité du tonnerre à Tananarive.** [Audibility of thunder at Tananarive.] *La Météorologie*, *4th Ser.*, No. 21:19–25, Jan.–March, **1951.** 2 figs., French, English and Spanish summaries p. 19. **DWB**—The methods of measuring the audibility of thunder and their reliability are discussed. Instances in which thunder was heard at distances of 39 to 57 km, from the point where lightning occurred, are cited. (*Same item as* 3.2–204, Feb. 1952, *MAB.*) *Subject Headings:* **1. Thunder 2. Madagascar.**—*I.L.D.*

10G–26 551.596.1

Veldkamp, J., **On the propagation of sound over great distances.** *Journal of Atmospheric and Terrestrial Physics*, 1(3):147–151, **1951.** 4 figs., 2 tables, 9 refs., 2 eqs. **DWB**—Author calculated tracks, travel time and energy of air waves of the order of 0.1 c/s. He found two abnormal waves, one reflected between 40 and 55 km and the other above 80 km, both partly double. Waves of frequency 0.1 can reach a height of 180 km and a surface distance of 800 km. Frequencies above 70 c/s are absorbed in upper stratosphere. (*Same item as* 2.9–182, Sept. 1951, *MAB.*) *Subject Heading:* **1. Anomalous sound propagation.**—*C.E.P.B.*

1952

10G–27 551.596.5:551.501.89(473)

Arabadzhi, V. I., **O nekotorykh kharakteristikakh groma.** [On some characteristics of thunder.] *Akademiia Nauk, SSSR, Doklady*, 82(3):377–378, Jan. 12, **1952.** 2 figs., 3 refs. **DLC**—A brief report on experimental observation of thunder made in summer 1951 in Ganna-les, Minsk Province. For these observations the method described by W. SCHMIDT in *Meteorologische Zeitschrift*, **1941,** was used, but the recorder had greater sensitivity than the one used by SCHMIDT. The highest power of thunder was recorded 19 times by compression of the air, but SCHMIDT observed this phenomenon by exhaustion of the air. The usual frequencies of sound oscillations were observed by SCHMIDT as 2 hertz, in Ganna-les they were about 0.5 herz. The author suggests that these differences may be due to differences in actual thunder conditions. (*Same item as* 3.8–230, Aug. 1952, *MAB.*) *Subject Headings:* **1. Thunder observation techniques 2. Ganna-les, U.S.S.R.**—*N.T.Z.*

10G–28 551.596.1:614.83

aufm Kampe, Hans Joachim, **Ergebnisse der Schallmessung Helgoland.** [Results of acoustic measurement at Helgoland.] *Meteorologische Rundschau*, 5(5/6):99–105, May/June **1952.** 12 figs., 2 tables, 3 eqs. **DWB**—On April 18, 1947, 6000 tons of explosive were set off at Helgoland; normal and anomalous waves recorded at German stations are charted up to a distance of 440 km. Results are discussed in the light of upper winds and temperatures and the weather situation, and the paths of anomalous waves plotted, with some alternative solutions. Above tropopause at 10 km a rise of temperature is determined, to a value of nearly 50°C at 50 km. (*Same item as* 4.3–295, March 1953, *MAB.*) *Subject Headings:* **1. Explosion waves 2. Helgoland explosion (1947).**—*C.E.P.B.*

10G–29 551.596.1:551.524.7:551.557.2

Crary, A. P., **Stratosphere winds and temperatures in low latitudes from acoustical propagation studies.** *Journal of Meteorology*, 9(2):93–109, April **1952.** 22 figs., 8 tables, 11 refs. **DWB.** Also his: **Revision of high-level wind and temperature measurements in Bermuda.** *Ibid.*, 11(3):257, June **1954.** fig., table, 2 refs. **DLC**—Tests of sound-ranging method near Hawaii, Canal Zone, Bermuda and Florida are described and velocity-height curves up to 40–60 km (100–120 km near Florida) presented. Most probable temperatures and winds are deduced. The results confirm earlier studies, showing light winds over continental areas in low latitudes in winter and low temperatures and high winds over oceanic areas. The sources of error in this experimental method are discussed. (*Same item as* 3.9–240, Sept. 1952 and 6.4–215, May 1955, *MAB.*) *Subject Headings:* **1. Acoustical soundings 2. Upper air temperatures 3. Stratospheric winds.**—*C.E.P.B.*

10G–30 551.596.1:621.396

Doak, P. E. (*Dept. of Math., Univ. Manchester*), **The reflection of a spherical acoustic pulse by an absorbent infinite plane and related problems.** *Royal Society of London, Proceedings*, 215(1121): 233–254, Nov. 25, **1952.** 2 figs., 6 refs., 8 eqs. **DLC**—Experimental results of the reflection of a short train of sine waves, duration of about 10 m, by an infinite plane absorbent wall are analyzed and discussed theoretically in relation to blast waves and electromagnetic waves. Some possible direct applications are indicated as to reflection of blast waves and waves of transient radiation by an electric dipole. (*Same item as* 5.5–240, May 1954, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Radio wave propagation 3. Reflection echoes.**—*W.N.*

10G–31 551.510.5:551.596.1:551.54

Dumézil-Curien, Perrine, **Ondes de compression dans une atmosphère en équilibre radiatif.** [Compression waves in an atmosphere at radiative equilibrium.] *Académie des Sciences, Paris, Comptes Rendus*, 235(22):1369–1370, Dec. 1, **1952.** 2 refs. **DWB**—Compression waves generate an acoustic radiation pressure whose variation with depth creates a gravitation greater than the actual gravity in an appreciable portion of the (stellar) atmosphere. *Subject Headings:* **1. Stellar atmospheres 2. Compression waves.**—*Transl. of author's abstract.*

10G–32 551.557:551.513

Jenkins, C. F., **A survey of available information on winds above 30,000 feet.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 24, Dec. **1952.** 35 p. 3 figs., table, 58 refs. **DWB**—Includes table of wind direction and speed from 10–50 km, computed from observations of sound propagation made during one year at 40°N. (For a fuller abstract, *see* 4F–103, June 1953, *MAB.*) *Subject Headings:* **1. Stratospheric winds 2. Stratospheric circulation 3. Meridional cross sections.**—*A.A.*

10G–33 551.596.1:550.34(54)

Mukherjee, S. M. (*Met. Off., Poona*), **Landslides and sounds due to earthquakes in relation to the upper atmosphere.** *Indian Journal of Meteorology and Geophysics*, 3(4):240–257, Oct. **1952.** 2 figs., 3 tables, 37 refs. **DWB**—General discussion of abnormal propagation of sound due to earthquakes with special reference to the earthquake of Aug. 15, 1950. A comprehensive survey of sound observations for this earthquake and some important previous ones is added. Travel times of abnormal sounds computed and connection with thermal structure of the upper stratosphere briefly described. (*Same item as* 5.3–325, March 1954, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Earthquakes 3. Upper atmosphere 4. India.**—*A.A.*

10G–34 551.508.21:551.510.535:551.524.7:551.557

Richardson, J. M. and Kennedy, W. B., **Atmospheric winds and temperatures to 50-kilometers altitude as determined by acoustical propagation studies.** *Acoustical Society of America, Journal*, 24(6):731–741, Nov. **1952.** 9 figs., 2 tables, 20 refs. **DLC**—Between July 1950 and May 1951, 500 charges of 200 lb each of TNT were fired thus obtaining an average of three sets of data per month sufficient for calculation of high altitude winds and temperatures over Wray (40°N, 102°W).

Winds generally westerly and of large magnitude during winter and light easterly during summer with large fluctuations during equinoctial periods. Temperatures, wind speeds and azimuth at 5 km intervals to 50 km for each set of observations tabulated. (*Same item as* 4F–117, June 1953, *MAB.*) *Subject Headings:* **1. Acoustical soundings 2. Ionospheric winds 3. Ionospheric research 4. Wray, Colo.**—*G.J.E.*

10G–35 551.511:551.596.1:534.22

Scorer, R. S., **Sonic and advective disturbances.** *Royal Meteorological Society, Quarterly Journal*, 78(335):76–81, Jan. **1952.** 13 refs. **DWB**—An interesting comparison of the atmospheric processes involved in atomic explosions "little bangs" which are shock waves, "big bangs" like Krakatoa and the Siberian meteorite (compression-gravity waves) and slow distributed heating giving rise to advective disturbance and mass transport by wind. It is concluded that all meteorological effects are advected with the air, none propagated through it. (*Same item as* 3.4–110, April 1952, *MAB.*) *Subject Headings:* **1. Advection theory 2. Explosion waves.**—*C.E.P.B.*

10G–36 551.596.5

Taljaard, J. J., **How far can thunder be heard?** *South Africa. Weather Bureau, News Letter*, No. 35:4, Feb. **29, 1952.** Also: *Weather*, 7(8):245–246, Aug. **1952. DWB**—Thunder has been reported from sources 50–60 mi distant (Germany) though usually 10 mi is considered extreme distance it is likely to be heard. Anomalous propagation might account for greater distances such as in the present instance. The author heard thunder estimated to come from a source 60 to 70 mi (or more) distant, while visiting the Karroo district of South Africa on Feb. 7, 1952 (11:30–12:00h). Showers were reported at 11:30 at Witputs 67 mi from observer. Base of clouds could not be seen with flat horizon and 3600 ft cloud base (estimated from dry and wet bulb) would be 73 miles. (*Same item as* 4.3–296, March 1953, *MAB.*) *Subject Headings:* **1. Audibility of thunder 2. Acoustical propagation.**—*M.R.*

10G–37 551.510.53:551.507.362:551.596.1

†Temple Univ. Research Institute, **Research in the physical properties of the upper atmosphere with V-2 rockets.** Contract W19-122-AC-12, Final Report, April 1, 1948 to Feb. 29, 1952, Aug. 20, **1952.** 101 p. 31 figs., eqs., 148 refs. on humidity measurements, p. 31–39; 26 general refs., p. 98–99; 43 refs. on acoustics p. 99–101. **DWB**—This report covers work completed during the past four years. In particular it includes work on ion clusters, statistical fluctuation of density at a given point in a gas, and the fall of a warhead with a parachute from high altitude. These are theoretical considerations and the original reports should be read for details (*see, for example*, 2.9–22, 4.6–253, 5.3–326 and 6.5–356, *MAB*) since only the results can be given here.—It also includes work on the measurement of absorption coefficients of air at low pressures and at various frequencies. This gives results that fall below the classical at low pressures and are believed to be due to the effective viscosity coefficient. Experimental curves and theoretical considerations are given.—Sample calibration curves for microphones and of the anechoic chamber are included as well as photographs and descriptions of various pieces of apparatus such as wind tunnel, ultrasonic wave analyzer, pulser, apparatus installed in Blossom IV-G, automatic feed wire exploder, etc.—Results on measurements of noise on the skin of the missile and on meteoritic impacts on the nose obtained during the V-2 flights are given.—Various sources of rather intense sound were investigated as to their suitability for high altitude work, including spark gaps, explosives (primers) and exploding wires.—Transient responses of microphones and velocity of sound in tubes and at various pressures were investigated. (*Same item as* 5.3–123, March 1954, *MAB.*) (For 1956 Report *see* 10G–76.) *Subject Headings:* **1. Upper atmosphere research 2. Rocket instrumentation 3. Acoustical soundings. I. Bohn, J. Lloyd II. Nadig, Francis H.**—*Author's abstract.*

10G–38 551.576.11:551.501.776:534

Zanotelli, Guglielmo (*Rome, Ist. Naz. di Geof.*), **Sondaggio acustico delle nubi.** [Acoustical sounding of clouds.] *Annali di Geofisica*, 5(1):55–76, Jan. **1952.** 10 figs., 3 refs. English summary p. 75–76. **DWB**—An elaborate analytical method is found for determining reflection indexes of waves at various frequencies in the audible scale, as functions of droplet size and number in the reflecting cloud. Values of audibility of the reflected sound with and without an amplifier are calculated. It is pointed out that this method of estimating drop size and number by recording the intensity of reflected sounds at varying frequencies should be very useful in observing quick changes taking place in a cloud owing to evaporation, condensation, cohesion, etc., particularly during stormy conditions. (*Same item as* 4.3–210, March 1953, *MAB.*) *Subject Headings:* **1. Acoustical soundings 2. Cloud physics 3. Drop size distribution.**—*G.T.*

1953

10G–39 551.511:551.596

Čadež, Marjan, **Über die Strömung der inneren und der kinetischen Energie in der Atmosphäre.** [On currents of internal and kinetic energy in the atmosphere.] *Beiträge zur Geophysik*, 63(2):130–144, **1953.** 2 figs., 2 refs., 26 eqs. **DWB**—In addition to material transport of air in one direction (wind) there are innumerable longitudinal wave impulses (compression and rarefaction) radiating in all directions with the velocity of sound, e.g., from the centers of cyclones, and carrying energy. The equations of these energy waves and their decay are set out but the energy transport is small and cannot be calculated. (*Same item as* 4.11–105, Nov. 1953, *MAB.*) *Subject Headings:* **1. Acoustical phenomena 2. Energy dispersion.**—*C.E.P.B.*

10G–40 551.596.1:551.547

Caro, D. E. and Martin, L. H., **Velocity of sound in air at low pressures.** *Nature*, London, 172(4374):363–364, Aug. 22, **1953.** 5 refs., 2 eqs. **DLC**—A significant increase of velocity of sound has been reported below 15 cmHg. New experiments are described. After correction it was found that at 1000 and 250 cycles/sec there is no variation of free-space velocity with pressure down to 5 mmHg. (*Same item as* 5.1–313, Jan. 1954, *MAB.*) *Subject Heading:* **1. Acoustical propagation.** —*C.E.P.B.*

10G–41 551.596.1:551.551

Kharanen, V. Ia., **O rasprostranenii zvuka v srede so sluchaĭnymi fliuktuatsiiami pokazatelia prelomleniia.** [Sound propagation in an environment of random fluctuations of refractive index.] *Akademiia Nauk, SSSR, Doklady*, 88(2):253–256, **1953.** 4 refs., 13 eqs. **DLC**—Theoretical study of sound propagation, assuming that refractive index is a continuous steady random function of coordinates with macroscopic isotropy. Mean statistical characteristics derived considering autocorrelation and assuming that the random processes are of the type of Markov chains. Study made originally for sound propagation in the surface layer of the sea with a thermocline, where under certain conditions the sound does not reach the surface. In order to use the solution the scale of turbulence computed from the autocorrelation function must be known. (*Same item as* 4.11–289, Nov. 1953, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Turbulence effects.**—*A.A.*

10G–42 551.510.62:621.396:551.596.1

Koch, Bernhard, **Réflexion de micro-ondes par des phénomènes de détonation.** [Reflection of microwaves by explosion phenomena.] *Académie des Sciences, Paris, Comptes Rendus*, 236(7): 661–663, Feb. 16, **1953.** refs. **DWB**—Using the Doppler-Fizeau effect, it is possible to detect the echoes of an electromagnetic wave from the explosive wave front. By using this method it is possible to measure the speed of the explosive wave and the ionization of the gases in the explosion. A table gives seven experimental values of speeds thus determined, showing an average of 7994±47 m/sec or ±0.6%. (*Same item as* 5.8–284, Aug. 1954, *MAB.*) *Subject Headings:* **1. Microwave reflection 2. Explosion waves.**—*M.R.*

10G–43 551.596:534:629.13

Lilley, G. M.; Westley, R.; Yates, A. H. and Busing, J. R., **The supersonic bang.** *Nature*, London, 171(4362):994–996, June 6, **1953.** 8 figs., 4 refs. **DWB**—The double (occasionally triple) bang heard when an airplane passes through the sound barrier is explained by consideration of movements of bow and tail waves relative to the plane at different Mach numbers. (*Same item as* 4.11–288, Nov. 1953, *MAB.*) *Subject Heading:* **1. Shock waves.**—*C.E.P.B.*

10G–44 551.593.12 551.596.1

Obukhov, A. M., **O vliianii slabykh neodnorodnosteĭ atmosfery na rasprostranenie zvuka i sveta.** [The influence of weak atmospheric heterogeneities on the dispersion of sound and light.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:155–156, **1953.** 11 refs., 50 eqs. **DLC**—A mathematical investigation of the problem dealing with the spread of waves in a medium characterized by a pulsating coefficient of refraction; this problem is particularly relevant to the theory of stellar scintillation and to various aspects of atmospheric acoustics. The problem is solved by means of linearization of equations which are satisfied by the phase and logarithm of the moving wave. By means of specific examples the author shows the applicability of approximate geometrical theory and the kind of correlations arising in the calculation of diffraction effects. (*Same item as* 5.5–227, May 1954, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Scintillation.**—*I.L.D.* (*Transl. of author's summary*).

10G–45 551.596.1:534.2:016

†Post, E. J. (*Natl. Res. Council, Ottawa, Canada*), **Radiation pressure and dispersion.** *Acoustical Society of America, Journal*, 25(1):55–60, Jan. **1953.** 3 figs., bibliog. p. 59–60, 8 eqs. **DLC**—The

paper starts with a brief discussion of the two components of acoustical radiation pressure in contrast with the single component obtained for electromagnetic radiation in vacuum. The two components of acoustical radiation pressure are correlated in a simple manner with the two distinct interaction possibilities of the obstacle and the medium, i.e., interaction with the wave motion only or interaction with the wave motion as well as with the medium itself. This picture appears to be consistent with the earlier conclusions of BRILLOUIN and RICHTER. Afterwards the result is generalized for dispersive media. It is shown that the component which is usually stated to be independent of the equation of state in the existing nondispersive theories should contain the time parameters of the equation of state in the form of a multiplying factor group, velocity over phase velocity. The present paper stresses the basic concepts rather than mathematical detail and concludes with an extensive bibliography and commentary. (*Same item as* 5.1–314, Jan. 1954, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Acoustics bibliographies.**—*Author's abstract.*

10G–46 551.596:534.2

Smith, P. W., Jr. (*Harvard Univ., Cambridge, Mass.*), **Precision measurement of the velocity of sound in air.** *Acoustical Society of America Journal*, 25(1):81–86, Jan. **1953.** 3 figs., 2 tables, footrefs. **DLC**—A method for the precise measurement of the velocity of sound is described in which the driving-point impedance of a connected loudspeaker to a closed tube of variable length is the frequency-controlling element of a bridge-stabilized oscillator. The operation of the system and the accuracy of measurement are analyzed. Results of measurements in air at 1 kc/sec, room temperature, and atmospheric pressure yield, when corrected to standard conditions, a velocity of 331.45±0.05 m/sec. (*Same item as* 6.9–339, Sept. 1955, *MAB.*) *Subject Heading:* **1. Sound velocity.** —*Author's abstract.*

10G–47 551.596.9:551.551

Tatarskiĭ, V. I., **O fliuktuatsiiakh fazy zvuka v turbulentnoĭ srede.** [Fluctuations of sound phase in a turbulent medium.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 3:252–258, **1953.** 5 figs., 2 refs., 40 eqs. **DLC**—The fluctuations of the sound phases received by two microphones situated in a turbulent medium are examined. Analysis is carried out in limits of geometric acoustics. The mean square of the fluctuations of phase difference is calculated with variable relationship between the base and the distance which is covered by sound in a turbulent medium. (*Same item as* 5.8–285, Aug. 1954, *MAB.*) *Subject Headings:* **1. Acoustical phenomena 2. Turbulence effects.**—*N.T. Zikeev.*

10G–48 551.507.362.1:551.510.535

Wegener, Kurt, **Die Erforschung der Atmosphäre durch die Rakete.** [Investigation of the atmosphere by rockets.] *Geofisica Pura e Applicata*, 24:68–70, Jan./April **1953.** 2 refs. English summary p. 68. **DLC**—Rocket measurements of temperature cannot be made accurately by current techniques but must be based on the propagation of sound. The solar constant and spectrum must also be recalculated considering rocket measurements of the ultrashort waves which are not all intercepted on a normal surface as are larger solar radiations, but are deflected by the earth's magnetic field. (*Same item as* 5.6–52, June 1954, *MAB.*) *Subject Headings:* **1. Rocket soundings 2. Ionospheric temperature measurement 3. Solar constant corrections 4. Acoustical temperature determination.**—*M.R.*

10G–49 551.596.1:551.575.1:551.573

Wei, Y. T., **Theory of attenuation of sound in foggy air due to evaporation and condensation processes.** *Acta Scientia Sinica*, Peking, 2(4):245–268, Dec. **1953.** figs., 20 refs., numerous eqs. **DLC.** Also in: **Chinese Journal of Physics,** 9(3):149–169, 1953. **DLC**—An elaborate review and development of the theory of sound extinction in aerosols, especially in fog or clouds, is presented in a clear and logical manner. Attenuation is zero at zero and infinite frequency and greatest at low audible frequencies. Evaporation and condensation occurs at the drop surfaces when the pressure changes (compression and rarefaction, respectively) and attending temperature changes occur with passage of the sound waves through the medium. The relation 1) between air density and particle concentration, 2) between the change in amount of liquid water and vapor, 3) the deviation of the equation of growth of droplets, and 4) diffusion and heat conduction coefficients are treated successively. Finally, the deviation of dispersion and absorption formula is presented, along with curves showing the relation between the dispersion and attenuation, and between attenuation and frequency. (*Same item as* 7.6–249, June 1956, *MAB.*) *Subject Headings:* **1. Sound attenuation in fog 2. Evaporation due to sound 3. Acoustical propagation.**—*M.R.*

1954

10G–50 551.593:551.596.1(431.1)

Andreev, I. I., **Sluchaĭ vidimogo rasprostraneniia zvukovoĭ volny po vozdukhu.** [Occurrence of visible propagation of sound waves in the air.] *Priroda*, Moscow, 43(4):112–113, April **1954.**

DLC—The reported occurrence was observed by the author in East Prussia during World War II. Author describes the sudden appearance on April 17, 1945, of a huge column of black smoke over the village of Fischhausen. No sound of explosion was to be heard either at the advent or during the subsequent movement of the wave. At a height of 200–250 m it took the form of a great mushroom, then the phenomenon began to disperse and spread in the air and finally emitted from its cap a circulatory air wave. The wave passed over a distance of 3–4 km in 10–12 seconds and when it reached the point where the author stood it disappeared completely. The origin of this unusual wave and its progress in the air was caused by a heavy explosion at Fischhausen. It was first observed as an optical phenomenon and only later as an acoustical phenomenon, in the form of a loud noise produced by a heavy explosion. (*Same item as* 6.8–353, Aug. 1955, *MAB.*) *Subject Headings:* **1. Visible propagation of sound 2. Optical phenomena 3. Anomalous sound propagation 3. Fischhausen, Germany.**—*A.M.P.*

10G–51 551.509.58:534.2 551.596.1

Cox, Everett F.; Plagge, H. J. and Reed, J. W., **Meteorology directs where blast will strike.** *American Meteorological Society, Bulletin*, 35(3):95–103, March 1954. 6 figs., 3 tables, 12 refs., 27 eqs. Also: Pack, Douglas H. (*Explosives Res. Group, Univ. of Utah*), **Simplification of method.** *Ibid.*, 39(7):364, July **1958.** fig., eqs. **DWB, DLC**—Successful forecasting of the locations where damage may result from blast waves emanating from (a) TNT or (b) atomic explosion must be based on good forecasts of temperature and wind (and, to some extent, humidity) gradients in the troposphere. Ordinarily pressures from shock waves are reduced to ineffective values at 500 ft (a) or 3.7 mi (b), but focusing of ray paths due to inversions of temperature and humidity or wind shear, may give zones of silence and corresponding areas of abnormal shock. Tables and graphs for computation and illustration of method used by author and collaborators in N. Mex. are presented along with theoretical basis for calculations. Criteria for estimating damage to plate glass or ordinary windows are given. Plate glass is subject to long period oscillations from big blasts as well as to pressures. In the comments by PACK, the elaborate calculation involved in (COX, PLAGGE and REED's) prediction where the sound will return, is greatly facilitated by a simplified mathematical form. (*Same item as* 6.3–83, March 1955, *MAB.*) *Subject Headings:* **1. Bomb blast waves 2. Anomalous sound propagation 3. Shock wave forecasting.**—*M.R.*

10G–52 551.524.7:551.557:551.596.1

Crary, A. P.; Kennedy, William B. and Bushnell, Vivian C., **Atmospheric winds and temperatures at heights up to 60 kilometres as determined by acoustical propagation studies.** (In: American Meteorological Society and Royal Meteorological Society, **Proceedings of the Toronto Meteorological Conference, Sept. 9–15, 1953.** pub. **1954.** p. 9–13. 5 figs., table, 6 refs.) **DWB**—Results of measurements of temperature profiles up to 50 km, maximum wind speed and wind azimuth in Canal Zone, Florida, New Mexico, Bermuda, Colorado and Alaska, from anomalous sound transmission of explosions, are presented in a table and charts and discussed. (*Same item as* 6.3–141, March 1955, *MAB.*) *Subject Headings:* **1. Temperature of the stratosphere 2. Winds in the stratosphere 3. Acoustical soundings.**—*C.E.P.B.*

10G–53 551.596.1:534.2

Gavreau, Vladimir and Miane, Marcel, **Sur la pression de radiation et la nature non-isotrope des pressions acoustiques aux grandes intensités.** [Radiation pressure and the anisotropy of acoustic pressure of great intensities.] *Académie des Sciences, Paris, Comptes Rendus*, 238(22):2148–2150, May 31, **1954.** 2 figs. **DWB**—An experimental arrangement designed for determining the pressure of sound radiation is described and illustrated and experiments made with the apparatus are discussed. It is found that sound pressure is anisotropic at high sound intensities. This is attributed to an increase in molecular velocity, which probably also results in an increased speed of propagation of intense sounds. At 145 db, for example, the velocity of 34,700 cm/sec was obtained instead of the theoretical value of 34,000 cm/sec for 20°C. (*Same item as* 6.5–353, May 1955, *MAB.*) *Subject Headings:* **1. Acoustic pressure 2. Acoustical propagation.**—*G.T.*

10G–54 551.596.1 532.59

Gutenberg, B., **Effect of low-velocity layers.** *Geofisica Pura e Applicata*, Milan, 29:1–10, Sept./Dec. **1954.** fig., 42 refs., 2 eqs. **DWB**—Effects of low-velocity channels in the atmosphere, the ocean and the solid earth are discussed. There are two major low-velocity channels in the atmosphere, one with its axis at the tropopause, and another at a height of about 80 km. They produce "zones of silence" and permit the transmissions of waves involving the whole atmosphere. Low-velocity layers in the ocean result from the combined effects of temperature, pressure and salinity. In the earth, the sudden decrease of velocity at the boundary of the core produces a low-velocity channel for elastic waves. In the earth's crust there are two major low velocity channels, one below the Mohorovičić discontinuity, the other at a depth of about 15 km. Misinterpretation

of their effects has caused incorrect conclusions concerning the structure of the outer portion of the earth's mantle. (*Same item as* 6.10–296, Oct. 1955, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Wave propagation.**—*Author's abstract.*

10G–55 551.596.1:551.557:551.524.7

Kennedy, William B. and Brogan, Lee, **Determination of atmospheric winds and temperature in the 30–60 km region by acoustic means (a study of annual and diurnal variations).** Denver Univ. Denver Research Institute, Contract AF 19(122)-252, Final Report, June 30, **1954.** 97 p. 21 figs., 9 tables, 87 refs., 78 eqs. **DWB**—The annual variation of winds and temperatures in the 30–60 km region (Colorado, July 1950–Aug. 1952) and their diurnal variation (New Mexico, Oct. 20–24, 1952) were investigated by means of acoustic propagation studies with explosive sources. The report includes discussion of the calculations involved, tables and graphs of data obtained, and conclusions reached. Strong westerly winds were found to prevail in winter and weak easterly winds in summer. During daytime the wind force was found to decrease while temperature increased. The report includes discussion of possibilities of acoustic sounding involving non-explosive sources. Abstracts of **Scientific Reports** 1–4 published under the contract are appended. (*Same item as* 6.7–345, July 1955, *MAB.*) *Subject Headings:* **1. Acoustical soundings 2. Upper air temperature measurement 3. Upper air wind measurement.**—*G.T.*

10G–56 551.596.1(02) 534

Krasil'nikov, V. A., **Zvukovye volny v vozdukhe, vode i tverdykh telakh.** [Sound waves in air, water and solid bodies.] 2nd rev. ed. Moscow, Gos. Izdat., **1954.** 439 p. 291 figs. (incl. photos and port.), table, 18 refs., eqs. **DLC**—A comprehensive and popular text on the propagation of sound and ultra sonic waves in the air (atmospheric acoustics), in water (hydro acoustics) and in the earth (seismology) and their utilization. All questions are treated on the basis of the most recent advances in modern acoustics. Ch. 1 deals with Vibrations and waves; Ch. 2, Sound waves in the air; Ch. 3, Receivers and emitters, Oscillographs; Ch. 4, Experiments with sound and sound analysis (speed, temperature effects, propagation, interference, dispersion); Ch. 5, Ultrasonic air waves (shock and explosion waves); Ch. 6, Propagation of sound in enclosed spaces and in the free atmosphere; Ch. 7, Sound and ultrasonic waves in water (sound of the sea); Ch. 8, Sound and ultrasonic waves in solid bodies; and Ch. 9, Propagation of elastic waves in the earth's crust. The manual is intended for high school teachers, college and technical school studients, engineers and hydroacousticians. (*Same item as* 7.1–12, Jan. 1956, *MAB.*) *Subject Heading:* **1. Acoustical propagation textbooks.**—*A.M.P.*

10G–57 551.596.1

Sretenskiĭ, L. N., **Rasprostranenie zvuka v izotermicheskoĭ atmosfere.** [Propagation of sound in an isothermal atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:134–142, **1954.** 2 figs., 17 eqs. **DLC**—A theoretical analysis of the acoustic field of a point source of sound propagating waves of constant frequency in an isothermal atmosphere. The potential of the acoustic field is obtained with the aid of the Fourier-Bessel Integral. Asymptotic expressions suitable for large distance from the source are derived for this potential field. These formulas are:

$$\phi = \frac{-Q}{\pi} \frac{\alpha \cos\theta}{1-\alpha\cos\theta} \frac{\exp\left[-\frac{\zeta}{2c^2}(\alpha-\cos\theta)\sqrt{r^2+z^2}\right]}{\sqrt{r^2+z^2}}$$

and

$$\phi = \frac{Q}{4\pi} \frac{\beta\cos\theta}{\sqrt{1+\beta^2\cos^2\theta}} \frac{\exp\left(\frac{\zeta}{2c^2}\sqrt{r^2+z^2\cos\theta}\right)}{\sqrt{r^2+z^2}} \exp\left[i\left(\sigma t - \frac{\zeta B}{2c^2}\sqrt{r^2+z^2}-\delta\right)\right].$$

(*Same item as* 6.8–354, Aug. 1955, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Isothermal atmosphere.**—*I.L.D.*

10G–58 551.596.1:551.59

Temchenko, P. E., **Eshche odin sluchaĭ vidimogo rasprostraneniia zvukovoĭ volny po vozdukhu** [Another occurrence of visible propagation of sound waves in the air.] *Priroda*, Moscow, 43(11):113 Nov. **1954.** **DLC**—Describes a case of visible propagation of a sound wave at a height of 50–100 m produced by the explosion of German bombs and observed by the author from a distance of 4–5 km during a raid of enemy bombers on the outskirts of Kerch (S. Crimea), in April 1944. Air waves similar to waves produced in water into which an object has been dropped, emanated from the upper cupola-shaped part of a smoke column at the moment of its mushrooming and spread in concentri

circles. The sound of a heavy explosion was heard at the moment when the wave reached the point where the observer stood. (*Same item as* 7.1–359, Jan. 1956, *MAB.*) *Subject Headings:* **1. Explosion waves 2. Visible acoustical waves 3. Kerch, Crimea, U.S.S.R.**—*A.M.P.*

10G–59 551.501.75:551.557:551.596.1

Von dem Borne, Heinrich, **Windmessung auf akustischer Grundlage.** [Acoustic wind measurement.] *Meteorologische Rundschau*, 7(11/12):217–220, Nov./Dec. **1954.** 3 tables, 10 refs., 5 eqs. **DWB**—Methods are set out, with tables, for determining wind velocity from deformation in the free air of a sound wave, using 4 microphones placed in 4 main directions around the source, and timing arrival of the sound or measuring phase changes. The results are stated to be accurate if the air temperature is known. (*Same item as* 6.6–58, June 1955, *MAB.*) *Subject Heading:* **1. Acoustical wind sounding.**—*C.E.P.B.*

10G–60 551.541:623.454.8

*Yamamoto, Ryozaburo, **Microbarographic oscillations produced by the explosions of hydrogen-bombs.** *Kyoto. Univ. Meteorological Research Institute, Meteorological Notes*, Ser. 2, No. 1, Nov. **1954.** [14 p.] 8 figs., 4 tables, 5 refs. Reprint from *Kyoto. Institute for Chemical Research, Bulletin*, Nov. **1954.** p. 120–133. Shorter version in *Weather*, 10(10):321–325, Oct. **1955. DWB**—Microbarographic records obtained at tripartite storm microbarograph station at Shionomisaki in S. Central Japan on March 27, 1954, showed speeds similar to those from Krakatoa and Great Siberian meteor (1908) which speeds approach the speed of sound whereas those from storms travel at 1/10 to 1/5 that speed. Microbarograph records calculated at 30 other places in Japan also showed high velocities, and on Nov. 1, 1952, March 1, 1954, April 26, 1954 and May 5, 1954 showed similar characteristics. Map shows stations whose location, observers and instruments are described or listed. Characteristic microbarograms from Shionomisaki for 5 occasions noted above, indicate common origin as can be seen in reproductions—conclusion from speed and direction calculations is that the waves originated at Bikini. Speeds are slightly less than that of sound and increase in warm weather, whereas Krakatoa wave was nearer the speed of sound. The latter wave traveled around the earth several times, but no note of the H-bomb waves doing so could be detected. No seismic waves, such as occurred in both Krakatoa and Siberian meteor explosions, were detected. Mareograms (reproduced) did appear to show wave disturbances originating at Bikini, in all 5 cases. Periods of 2 min. followed by 1 min. waves were observed in both Siberian meteor and Shionomisaki records. These confirm theoretical points involving a discontinuity at 40 km. (*Same item as* 7.2–170, Feb. 1956, *MAB.*) *Subject Headings:* **1. Microbarograph oscillations 2. Explosion waves 3. Acoustical propagation 4. Great Siberian Meteor (1908) 5. Krakatoa eruption (1908) 6. Bikini H-bomb tests (1952–54) 7. Shionomisaki, Japan.**—*M.R.*

1955

10G–61 551.596.1:551.524.7:551.557

Crary, A. P. and Bushnell, Vivian C., **Determination of high-altitude winds and temperatures in the Rocky Mountain area by acoustic soundings, October 1951.** *Journal of Meteorology*, 12(5):463–471, Oct. **1955.** 6 figs., 4 tables, 8 refs. **DWB**—On each of 10 tests three 4000-lb bombs were dropped 35 km apart by aircraft and recordings made at 4 listening posts. The winds and temperatures were calculated up to 50 km. At the temperature reversal near 50 km (−55°C at 30 km, 3–6°C at 45 km) light variable winds were found. Above 50 km wind and temperature effects could not be separated but an assumed temperature curve gave westerly winds up to 100 m/s at 70–80 km with shears up to 10 m/sec/km. (*Same item as* 7.3–301, March 1956, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Upper air winds 3. Acoustical sounding 4. Rocky Mountains.**—*C.E.P.B.*

10G–62 551.596.1

Ertel, Hans, **Ein Problem der meteorologischen Akustik: Die tagesperiodische Variation der Schallintensität.** [Problem in meteorological acoustics: the daily variation of sound intensity.] *Akademie der Wissenschaften, Berlin. Klasse für Mathematik, Physik und Technik, Sitzungsberichte*, No. 2, **1955.** 17 p. 14 refs., 30 eqs. **DLC**—Humboldt's quantitative explanation of the daily periodic variation of sound intensity is discussed and a quantitative, theoretical treatment of this phenomenon is presented. It is shown that the thermal convective variation of atmospheric temperature causes a daily periodic damping of sound amplitude. Accordingly the extinction coefficient of sound intensity is directly proportional to the thermal-convective temperature variations which show a maximum by day and a minimum by night. (*Same item as* 8.9–329, Sept. 1957, *MAB.*) *Subject Headings:* **1. Diurnal sound intensity variations 2. Acoustical phenomena.**—*I.L.D.*

10G–63 551.596.1

Groves, G. V., **Geometrical theory of sound propagation in the atmosphere.** *Journal of Atmospheric and Terrestrial Physics*, London, 7(3):113–127, Sept. **1955.** 4 figs., 14 refs., 52 eqs. **DWB**—The propagation of sound in an inhomogeneous moving medium, e.g., the atmosphere, is treated along the lines of geometric optics. A solution is obtained by assuming that the velocity of sound and the wind velocity are functions only of height. This is applied to the case of a ground level source reflected by a temperature inversion in the upper atmosphere, and expressions are found for the distance at which it returns to earth and the time of travel. The results agree with observations of zones of abnormal audibility. The effect of upper winds is briefly considered. (*Same item as* 7.2–286, Feb. 1956, *MAB.*) *Subject Heading:* **1. Acoustical propagation in inhomogeneous media.**—*C.E.P.B.*

10G–64 551.596.1:551.557(789)

Kennedy, William B.; Brogan, Lee and Sible, Norman J., **Further acoustical studies of atmospheric winds and temperatures at elevations of 30 to 60 kilometers.** *Journal of Meteorology*, 12(6): 519–532, Dec. **1955.** 10 figs., 4 tables, 9 refs., 16 eqs. **DWB**—Results of firing 200 lb charges of TNT and recording elevation and azimuth of sound wave by an array of microphones are described. Operations in Colorado, Oct. 31, 1951–Aug. 28, 1952 confirmed the broad conclusions of the earlier Colorado series. Those conducted in New Mexico bihourly from Oct. 20–24, 1952 (T-Day) are fully treated. The winds and temperatures between 25 and 55 km are tabulated and plotted. The average wind was 23–39 m/s from 242–276°, but there were marked fluctuations over very short periods. Temperature increased as wind decreased with advancing time of day. (*Same item as* 7.5–261, May 1956, *MAB.*) *Subject Headings:* **1. Acoustical upper wind measurement 2. New Mexico.**—*C.E.P.B.*

10G–65 551.551:550.38:534.2

Kulsrud, Russell M. (*Yerkes Obs.*), **Effect of magnetic fields on generation of noise by isotropic turbulence.** *Astrophysical Journal*, Chicago, 121(2):461–480, March **1955.** 2 figs., 2 tables, 11 refs., 83 eqs. **DLC**—LIGHTHILL's (1952) and PROUDMAN's (1952) results on the generation of aerodynamic noise by isotropic turbulence are generalized to include magnetic effects. It is found that if there are only turbulent magnetic fields present and no constant magnetic field, the magnetic turbulence generates sound very efficiently and increases considerably the generation of sound by kinetic turbulence. If there is a constant magnetic field, hydromagnetic waves are generated instead. For the modified sound mode of the hydromagnetic waves, a result similar to the case of no general field is obtained. No energy is generated into the Alfvén and modified Alfvén waves unless the energy density of the magnetic field is greater than the energy density of the kinetic turbulence. Expressions are found for the rate of noise generated per unit mass, and these results are applied to the problem of heating the chromosphere and the corona. (*Same item as* 7.4–202, April 1956, *MAB.*) *Subject Headings:* **1. Magnetic field influences 2. Isotropic turbulence 3. Acoustical propagation.**—*Author's abstract.*

10G–66 551.524.7:551.557:551.596.1(42)

Murgatroyd, R. J., **Wind and temperature to 50 km. over England. Anomalous sound propagation experiments, 1944–45.** *Great Britain. Meteorological Office, Geophysical Memoirs*, No. 95, **1955.** 30 p. 11 figs., 7 tables, 16 refs., 44 eqs. **DWB**—The geometry of zones of audibility is set out. In 16 experiments explosions at 7–10 points in England were recorded on lattices of microphones. Audibility (up to 387 km) and time of travel are tabulated. The experiments gave, with certain assumptions, the vertical distribution of temperature and wind 18–50 km. Temperature at 50 km varied from 310°A in July and Aug. to 264°A in Jan. Wind at 30–45 km changed from westerly 40–80 m/s in winter to easterly <20 m/s in summer. Radiosonde measurements up to 18 km are given for comparison. (*Same item as* 7.11–205, Nov. 1956, *MAB.*) *Subject Headings:* **1. Acoustical soundings 2. Upper air temperatures 3. Upper air winds 4. England.**—*C.E.P.B.*

10G–67 551.596.9

Press, Frank and Oliver, Jack, **Model study of air-coupled surface waves.** *Acoustical Society of America, Journal*, 27(1):43–46, Jan. **1955.** 8 figs., 6 refs., 2 eqs. **DLC**—Flexural waves generated in a thin plate by a spark source are used to investigate properties of air-coupled surface waves. Both ground shots and air shots are simulated in the model. Effects of source elevation, fetch of air pulse, and cancellation by destructive interference are studied. *Subject Headings:* **1. Air-coupled waves 2. Acoustical phenomena.**—*Authors' abstract.*

10G–68 551.596.1:551.524.7

Pridmore-Brown, David C. and Ingard, Uno, **Sound propagation into the shadow zone in a temperature-stratified atmosphere above a plane boundary.** *Acoustical Society of America, Journal*

27(1):36–42, Jan. 1955. 5 figs., 5 refs., 27 eqs. **DLC**—The sound field in the "shadow zone" (diffraction region) formed over a plane boundary in an atmosphere with a constant vertical temperature gradient is analyzed both theoretically and experimentally. The boundary condition at the plane is given by a normal acoustic impendance independent of the angle of incidence. As in the corresponding problem of underwater sound where the boundary is a pressure release surface, it is found that the major portion of the sound pressure in the shadow zone decays exponentially with distance at a rate proportional to the one-third power of frequency and two-thirds power of temperature gradient. The effect of boundary impendance enters mainly through its resistive component. The rate of sound decay for a pressure release boundary (zero impendance) is found to be 2.3 times that for a rigid boundary (infinite impendance). Sound pressure measurements in the shadow zone in a laboratory chamber in which a large temperature gradient was created were made for both hard and absorbing boundaries, and the results were found in essential agreement with theory. *Subject Headings:* **1. Acoustical propagation 2. Temperature gradient 3. Silence zone.** —*Authors' abstract.*

10G–69 551.596:534.321.9

Richardson, E. G., **Recent developments in ultrasonics.** *Science Progress*, London, 43(172):605–615, Oct. **1955.** 8 figs., 7 refs. **DLC, DWB**—An account of academic researches. In gases, trains of waves are investigated with an ultrasonic interferometer. The difference of behavior of shock waves in air and carbon dioxide is shown. Liquids and solids are also considered. (*Same item as* 7.3–300, March 1956, *MAB.*) *Subject Heading:* **1. Ultrasonics.**—*C.E.P.B.*

10G–70 551.596.1

Skeib, Günter, **Über die Schallausbreitung bei atmosphärischer Turbulenz.** [On the propagation of sound in atmospheric turbulence.] *Zeitschrift für Meteorologie*, 9(8):225–234, Aug. **1955.** 10 figs., table, 11 refs., 8 eqs. **DLC**—Measurements of the scatter of sound waves of 100 C to 4 Kc from a loud-speaker were made at Lindenberg, with micrometeorological observations for comparison. Absorption and scattering are discussed theoretically and the instrumental set-up described. At a height of 30 m and distance 150 m, with wind >5 m/s damping was 13 db, increasing with frequency, and decreasing to half at 3 m/s. At 5 m height and 50 m distance results were similar but the wind effect less. (*Same item as* 7.3–302, March 1956, *MAB.*) *Subject Heading:* **. Acoustical propagation.**—*C.E.P.B.*

10G–71 551.596.1:551.507.362

Stroud, W. G.; Terhune, E. A.; Venner, J. H.; Walsh, J. R. and Weiland, S. (*all, U. S. Signal Corps Engineering Labs., Ft. Monmouth, N. J.*), **Instrumentation of the rocket-grenade experiment for measuring atmospheric temperature and winds.** *Review of Scientific Instruments*, N. Y., 26(5):427–432, May **1955.** 9 figs., table, 11 refs. **DLC**—Results of 92 grenade explosions from 15 Aerobee rocket firings from March 3, 1950 to Sept. 4, 1953 at White Sands, N. M., are being analyzed with respect to efficiency of this method of determining upper air temperatures and winds. From 4 to 8 grenades are exploded on each flight at specified heights (which can be determined to ±1 to 2 ft at 100,000 ft by photographic methods). The formulas $C=kT^{\frac{1}{2}}$ and $V=C+W$ are used; where C is velocity of sound due to elasticity, k a constant, T =absolute temperature, V =velocity of propagation of sound wave, and W =wind velocity. Methods, rockets, rocket instrumentation, grenade structure, flash detectors, telemetering system, safety features, sound ranging equipment, positions of grenade explosions, ground temperatures and a summary of the 15 firings are included in text, and equipment and some of the records are illustrated. The temperatures and wind can be determined for each successive layer (between grenade firings). Timing to .1 millisecond is necessary. The sound detectors are arranged so they are nearly vertically beneath each grenade when it is exploded. (*Same item as* 7.4–102, April 1956, *MAB.*) *Subject Headings:* **1. Rocket-grenade wind determination 2. Rocket-grenade temperature determination 3. Acoustical soundings 4. Aerobee rocket firings 5. Rocket instrumentation 6. White Sands, N. Mex.**—*M.R.*

10G–72 534.2 551.596.5

Thiessen, G. J., **On the efficiency of an acoustic line source with progressive phase shift.** *Canadian Journal of Physics*, Ottawa, 33(11):618–621, Nov. **1955.** 3 figs., 7 refs., 4 eqs. **DWB, DLC**—The introduction of a small continuous phase shift along the length of a finite line source does not result in a decrease of energy radiated but simply causes the directionality pattern to change. When the phase shift is such that it corresponds to the phase shift with distance in a sound wave, then the directionality pattern has changed through 90° and the energy radiated begins to drop rapidly. At this point the slope of the energy vs. phase shift parameter curve increases with increasing frequency. (*Same item as* 8.3–351, March 1957, *MAB.*) *Subject Headings:* **1. Acoustics 2. Thunder.**—*Author's abstract.*

10G–73 551.596.1

Tsymbal, A. G. (*Zernovoĭ, Rostov area*), **Sluchaĭ vidimogo rasprostraneniĭa zvukovoĭ volny po vozdukhu.** [An instance of the visible propagation of sound waves through the air.] *Priroda*, Moscow, 44(9):114–115, Sept. **1955.** fig. **DLC**—This case of visible sound waves is unique in that it was observed under a cloud free sky, was associated with reddish light and the center of the wave was visible not at the place where the explosion had occurred but at points at a considerable elevation in the free atmosphere. A diagram of the visible sound waves is presented. (*Same item as* 8.11–280, Nov. 1957, *MAB.*) *Subject Heading:* **1. Visible acoustical propagation.**—*I.L.D.*

10G–74 551.596.5

Zamorskiĭ, A. D., **Grom pri iasnom nebe.** [Thunder during a clear sky.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:37–38, Nov./Dec. **1955. DWB, DLC**—In connection with a distant thunderstorm, a deafening thunder without any peals or lightning was heard in Leningrad on July 12, 1954 at 20 hours (Moscow time) on a sunny day with clear sky near the zenith. A description of the clouds before, during and after the occurrence of this phenomenon is given in detail. The distance of possible lightning was estimated at 500 m but the height of rain clouds in part of the sky was approximately 5 km. Simultaneous weather observations of the Leningrad weather station are given. An analysis of the cloud front and rain conditions leads to the conclusion that the thunder was of distant origin. (*Same item as* 9.4–286, April 1958, *MAB.*) *Subject Headings:* **1. Clear sky thunder 2. Distant thunderstorms 3. Leningrad, U.S.S.R.**—*I.L.D.*

1956

10G–75 551.596.1:551.510.535

Akasofu, Syun-ichi (*Geophysical Inst. Tôhoku Univ.*), **Dispersion relation of magneto-hydrodynamic waves in the ionosphere and its application to the shock wave.** *Tohoku Univ., Science Reports, 5th Series, Geophysics*, 8(1):24–40, Nov. **1956.** 6 figs., table, 35 refs., 68 eqs. **DWB, DLC**—In this paper, the dispersion relation for longitudinal and transverse propagation of the magneto-hydrodynamic waves in the full ionospheric conditions is obtained according to Schlüter's momentum balance equation. Then, a retarded sound-type shock wave is studied according to the conclusion given above. It is shown that some rapid varying irregular features of the $h'-f$ curve on the ionograms, which have vertical and horizontal motion may be attributed to a retarded sound-type shock wave. *Subject Heading:* **1. Shock wave effects on ionosphere.**—*Author's abstract.*

10G–76 551.596.1

Bohn, J. Lloyd; Nadig, Francis H.; Korneff, Theodore and Harbold, Mary L., **Investigation of velocity and attenuation of shock and acoustic waves at low pressure, development of sensitive total radiation detectors, negative point corona discharge and exploding wires.** Temple Univ. Physics Dept., Contract AF 19(604)-994, Final Report, March 30, **1956.** 138 p. 15 figs., 13 tables, eqs.—Results are given for the velocity of shock waves under various conditions of ambient pressure and ambient temperature and for various energies put into the exploding wire which was the source of the shock waves. Information is also given on several phenomena associated with the explosion of wires, an apparatus for multiple high speed photography, negative point to plane corona discharges, and experiments on total radiation detection using capacitor microphones. (For description of microphone assembly *see also* 7.1–153, Jan. 1956, *MAB.*) *Subject Headings:* **1. Sound velocity 2. Shock waves.**—*From authors' abstract.*

10G–77 551.596.5

De Jong, J. J. G., **Donder over grote afstand hoorbaar!** [Thunder audible at a great distance!] *Hemel en Dampkring*, 54(5):102, May **1956.** Also: Berlage, H. P., **Enkele opmerkingen bij: donder over grote afstand hoorbaar.** [Some remarks on thunder audible at a great distance.] *Ibid.*, p. 102–103. **DWB, DLC**—In the first paper, thunder audible at a distance of 130 to 140 km from the center of a storm area at Den Helder was reported. The synoptic conditions over northwest Europe, coincident with the storm which seemed to converge from a mist along the coast, are described. It is suggested that an inversion in the lower layer of the atmosphere served as a horizontal sounding board. In the paper by BERLAGE, the author gives further comments on the unusual thunder heard Nov. 6–7, 1955. The speed of sound propagation and the inversion as factors in the audibility of the thunder are considered but special attention is called to the possible role of prevailing wind conditions in this phenomenon. (*Same item as* 8.11–281, Nov. 1957, *MAB.*) *Subject Headings:* **1. Audibility of thunder 2. Acoustical propagation 3. Den Helder, Netherlands. I. Berlage, H. P.**—*I.L.D.*

10G–78 551.596.5

Doroshenko, F. D., **O raskatakh groma.** [Thunder peal.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:32, Aug. **1956. DWB, DLC**—An attempt is made to explain more adequately the rolling of

thunder following the first peal. Reflection of the sound from the clouds cannot explain why the rolls may be louder than the initial thunder clap. The author suggests that since the length of the lightning stroke may range from several hundred meters to several kilometers it is natural that the sound from the various parts of the stroke cannot reach the observer at the same time. This may explain the fact that the sound of thunder is a multiple sound. (*Same item as* 9.4–285, April 1958, *MAB.*) *Subject Headings:* **1. Audibility of thunder 2. Thunder peals.**—*I.L.D.*

10G–79 551.557:551.524.7:551.596.1:551.507.362.1

Groves, G. V., **Introductory theory for upper atmosphere wind and sonic velocity determination by sound propagation.** *Journal of Atmospheric and Terrestrial Physics*, London, 8(1/2):24–38, Feb. **1956.** 6 figs., 9 refs., 71 eqs. **DWB**—Expressions for use with the rocket-grenade experiment are developed for finding the mean values of the horizontal wind components and of the velocity of sound for a sound-ray travelling between two points. From data of the Upper Atmosphere Rocket Research Panel the mean velocity of sound is calculated up to 90 km. It is shown that for a nearly vertical ray received at the ground the contributions of second-order terms are less than 0.8 m/s, and for rays of any inclination generally less than 8 m/s. (*Same item as* 7.8–302, Aug. 1956, *MAB.*) *Subject Headings:* **1. Upper air wind measurement 2. Upper air temperature measurement 3. Sound waves 4. Rocket grenades.**—*C.E.P.B.*

10G–80 551.596.1

Kästner, Siegfried, **Das Reflexionsvermögen und die Durchlässigkeit eines Schichtsystems visko-elastischer Medien bei Einfall einer ebenen Schallwelle unter beliebigem Winkel.** [Reflectivity and transparency of a stratified system of visco-elastic media on which a flat sound wave falls at a given angle.] *Annalen der Physik*, 6 *Ser.*, 18(3/4):190–219, **1956.** 2 figs., 2 tables, footnote refs., 158 eqs. **DLC**-- Propogation of compression and shear sound waves in an unlimited viscoelastic medium differs from that in a purely elastic medium in that they become inhomogeneous and elliptically polarized. Propagation in a plane stratified medium is next considered; if the chain matrix of the sytem is known, the reflected and transmitted waves can be deduced as a function of the incident wave. (*Same item as* 8.2–326, Feb. 1957, *MAB.*) *Subject Heading:* **1. Acoustical propagation.**—*C.E.P.B.*

10G–81 551.596.1:551.551

Krasil'nikov, V. A. and Obukhov, A. M., **Propagation of waves in a medium with random inhomogeneities of the index of refraction (Survey).** *Soviet Physics: Acoustics*, N. Y., 2(2):103–110, **1956.** 2 figs., 23 refs., 26 eqs. Transl. of original Russian in *Akusticheskii Zhurnal*, Moscow, **1956.** (Paging unverified.) **DLC**—The survey is devoted to the problem of "waves and fluctuations" which in recent years has been developed in connection with a number of problems of atmospheric acoustics, hydroacoustics, atmospheric optics and the propagation of radio waves in the troposphere. More particularly the authors discuss the study of phenomena arising during the propagation of waves in a medium with weak random inhomogeneities caused by turbulence. The authors have written a number of papers on this subject; certain results of these papers are briefly discussed along with the results of a number of other authors (mostly Russian). *Subject Headings:* **1. Acoustical propagation in inhomogeneous media 2. Turbulence effects.**—*From authors' abstract.*

10G–82 551.521.14:551.578.46:551.596.1

Ooura, Hirobumi, **A study on the optical and the acoustical properties of the snow cover.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Rome*, 1954, (*Transactions*), 4:71–81, pub. **1956.** 5 figs., 8 refs., 3 eqs. **DWB** (M06 1611g S. Hyd, v. 4, 1954)—The snow cover does not always show perfect diffused reflection (type E) for the incidence of light. There are the diffused specular reflection (type C) and another reflection (type A) such that the nearer the angle of reflection approaches 90°, the higher the brightness of the snow cover becomes. By quantitative treatment, it is found that in reflection type E, the reflection from the deep places plays the main role while types C and A are due to the reflection from the shallow places whose depth is not more than ten times the size of the snow grain. The degree of polarization of reflected light for the incidence of the linearly polarized light increases with the angle of reflection and is nearly equal to the percentage of light reflected only at the boundary surface of the snow cover. The albedoes are in the range from 40 to 90%. The extinction coefficients in snow are in the range from 0.4 to 1.2/cm. The relation between these values and the number of snow grains in unit volume was investigated. It is found that the sound wave propagates mainly in air among the snow grains with the velocities about 180–300 m/sec. Velocity increases with the temperature and the grain size for the same density and with the decrease of density. The energy of sound reflected at the snow surface is about 10–40% of the incident. (*Same item as* 8G–169, July 1957, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Optical properties of snow 3. Acoustical properties of snow.**—*Author's abstract.*

10G–83 551.508.29:551.596.1

Pardue, D. R. and Hedrich, A. L. (*both, Diamond Ordnance Fuze Labs., Wash., D. C.*), **Absolute method for sound intensity measurement.** *Review of Scientific Instruments*, N. Y., 27(8):631–632, Aug. **1956.** 3 figs., 7 eqs. **DWB, DLC, DGL**—A thermometer has been constructed for measuring fast, small amplitude temperature variations. Its use as a microphone and sound intensity meter is considered and details of the theory, construction, and performance presented. The instrument is based on the principle that temperature fluctuations are related to sound speed and intensity. Instead of using ultrasonic pulses as BARRETT and SUOMI (*J. of Met.*, Dec. **1944**) did, continuous 400 Kc waves were used and time was measured for travel between two transducers. (*Same item as* 9.5–113, May 1958, *MAB.*) *Subject Headings:* **1. Acoustical thermometers 2. Sound intensity thermometers.**—*M.R.*

10G–84 551.596.1:534:662.2:539.1

Reed, Jack W. (*Sandia Corp., Albuquerque, N. M.*), **Weather determines blast prediction for atom tests.** *Weatherwise*, Boston, 9(6):202–204, Dec. **1956.** fig., photo. **DWB**—The mechanisms which produce damaging shock waves at a distance from a blast (such as created heavy damage to plaster and windows in Las Vegas, Nev. 80 mi from point of an atom bomb explosion in 1951) are outlined and illustrated. Reflection from surface inversions, strong upper winds, or from the ozonosphere inversion are among the factors discussed. The tests in question produced reflections which hit the earth at 27, 54 and 81 mi, etc. from the NTS. Pilot explosions 2 hrs before a test recorded on a network of microbarographs are now used to anticipate dangerous conditions. Actual explosion records are also studied for future use. (*Same item as* 8.8–318, Aug. 1957, *MAB.*) *Subject Headings:* **1. Acoustical waves 2. Shock waves 3. Anomalous sound propagation 4. Atom bomb tests 5. Las Vegas, Nev.**—*M.R.*

10G–85 551.596.1:551.524.7:551.557

Rothwell, P., **Sound propagation in the lower atmosphere.** *Acoustical Society of America, Journal*, 28(4):656–665, July **1956.** 7 figs., 3 tables, 6 refs. **DLC**—An account is given of experiments carried out in the lower troposphere to compare observations of audible range and of angle of descent of sound from shell bursts at various heights up to 10,000 ft with calculations made from elaborately measured temperatures and winds. In stable conditions there is satisfactory agreement. Several cases were observed of anomalous propagation in which sound rays starting upward from the source are bent back to the earth. These showed the phenomena associated with anomalous propagation on the larger scale, namely, inner and outer audibility zones, "zone of silence" and double or multiple reception of the single pulse from the source. From the experience gained in these experiments suggestions are made for (1) observation of the time interval between components of the usual double or multiple bangs from a single pulse source and (2) observation of the sound from explosions in the air as well as on the ground to obtain more information than has been obtained hitherto from sound propagation, about temperature and wind in the high atmosphere. Rocket explosions might be used for the latter purpose. *Subject Headings:* **1. Anomalous sound propagation 2. Silence zone 3. Upper air wind measurement 4. Upper air temperature measurement.**—*Author's abstract.*

10G–86 551.596.

Scheid, Georg, **Untersuchungen über die Schallausbreitung auf nahe Entfernungen.** [Investigations of sound propagation over short distances.] *Germany. Deutscher Wetterdienst, Berichte*, 4(25), **1956.** 16 p. 13 figs., 3 tables, 26 refs. **DWB, DLC**—The first part of this study is a review of the most important studies of anomalous sound propagation over short distances beginning with the investigations of R. LADENBURG and F. VON ANGERER in 1913 on sound propagation in the free atmosphere. In Pt. 2 the author extends the characteristic sound propagation curve of Kölzer to heights of 1500 m. It is shown that the resumption of the increase of sound velocity above the values at ground level is characteristic of anomalous sounds. The partial and complete return of the echo produced by the maximum velocity of the sound aloft is used to provide an explanation of the zone of anomalous audibility, in good agreement with the recordings. The increase in amplitude observed in the inner zone of second audibility is explained. (*Same item as* 9.5–28, May 1958, *MAB.*) *Subject Headings:* **1. Anomalous sound propagation 2. Sound velocity.**—*Trans. of author's abstract and I.L.D.*

10G–87 551.541:623.4

Yamamoto, Ryōzaburō (*Met. Res. Inst., Kyoto Univ.*), **Microbarographic oscillations produced by the explosions of hydrogen bombs in the Marshall Islands.** *American Meteorological Society, Bulletin*, 37(8):406–409, Oct. **1956.** 2 figs., 2 tables, 4 refs. **DWB**—The exact time that an oscillation (due to the explosion of a H-bomb) occurs on a microbarogram cannot be determined closer than 5 min but where distances from source are great (i.e., from 2000 to 5000 mi) the time and hence

the rate of propagation of the pressure wave through the atmosphere can be determined to some degree of accuracy. Many records for 14 island stations (shown on chart) in the Western Pacific were examined after explosions in Feb. 1952 and March, April and May 1954, and the speed of the wave toward the east found to be greater by 50 m/sec than that to the west, giving reasonable values for westerly winds in that vicinity and season. Stations located just to the west of Bikini showed no trace of the barometric oscillation. Mean value of speed of propagation was 336 m/sec to NE and 284 m/sec to NW. (*Same item as* 8.8 114, Aug. 1957, *MAB.*) *Subject Headings:* **1. Microbarograph oscillations from H-bomb waves 2. Explosion waves 3. Acoustical propagation 4. Bikini H-bomb tests, 1952–54 5. West Pacific islands 6. Bikini Island.**—*M.R.*

1957

10G–88 551.596.1:551.510.522

Arabadzhi, V. I., **O nekotorykh akusticheskikh kharakteristikakh prizemnogo sloia vozdukha.** [Acoustical characteristics of the air layer near the ground.] *Minsk. Gosudarstvennyĭ Pedagogicheskiĭ Institut, Uchenye Zapiski*, No. 7:87–91, **1957.** ORIGINAL UNCHECKED—Investigations of sound propagation in the ground layer of the atmosphere over various natural surfaces are described. The measurements were made over a straight road, a flat grass field, a water surface and a depression, with a microphone joined to an amplifier, and a sound generator operating on 3-watt power. Sound fluctuations were recorded at the amplifier output by a millivoltmeter. Sound reflection from a dense grass cover, from a surface of cut grass, and from bushes and leaves was recorded at frequencies of 0.2–4.0 Kc. The effect of atmospheric temperature inhomogeneities upon sound attenuation was investigated by means of laboratory apparatus which is described in detail. In these laboratory experiments attenuation coefficients between 10^{-5} and 10^{-4} cm^{-1} were obtained, which is in fair agreement with investigations made in the free atmosphere. *Subject Headings:* **1. Acoustical propagation in lower atmosphere 2. Micrometeorological effects on sound.**—*Referativnyĭ Zhurnal, Fizika*, No. 18844, 1958.

10G–89 551.596

Best, A. C., **Physics in meteorology.** N. Y., Pitman Pub. Corp., **1957.** Sec. 49, **Meteorological acoustics.** p. 123–126. **DLC** (QC863.B45)—The physics of sound propagation in the atmosphere, its velocity, attenuation, diffraction, etc., are discussed. The use of sound propagation (especially from large explosions, accidental or deliberate) for determining temperature and wind in the upper atmosphere is explained. *Subject Heading:* **1. Acoustics in meteorology.**—*G.T.*

10G–90 551.596.1

Brekhovskikh, L. M. and Ivanov, I. D., **Concerning one type of attenuation of waves propagating in inhomogeneously-stratified media.** *Soviet Physics: Acoustics*, N. Y., 1(1/2) 23–31, 1957. 2 figs., 2 refs., 46 eqs. **DLC** (QC221.S6). Transl. of original Russian in *Akusticheskiĭ Zhurnal*, Moscow, 1955. (Paging unverified)—Analysis of propagation of waves in a layer bounded on one end by an inhomogeneous medium in which the velocity of wave propagation diminishes with increasing distance from the layer boundary. It is shown that under these conditions the wave propagation is subject to supplementary attenuation, due to the energy "soaked up" by the inhomogeneous medium. A complete theory is presented for this problem and the magnitude of the attenuation is determined. *Subject Headings:* **1. Acoustical propagation in inhomogeneous media 2. Attenuation.** —*Authors' abstract.*

10G–91 551.596.1

Brekhovskikh, L. M. (*Academy of Sciences, U.S.S.R.*), **Sound propagation in inhomogeneous media.** *International Congress on Acoustics, 2nd, Cambridge, Mass., June* 1956, *Proceedings*, Issued Jan. **1957.** p. 90–94. 4 figs., 10 refs. German and French summaries p. 90. Also his: **Propagation of sound in inhomogeneous media (Survey).** *Soviet Physics: Acoustics*, N. Y., 2(3):247–255, **1957.** 7 figs., 13 refs. Transl. of original Russian in *Akusticheskiĭ Zhurnal*, Moscow, **1956.** (Paging unverified.) **DLC**—Sound propagation in inhomogeneous media is reviewed for the special cases of stratified media and for media with random inhomogeneities. In the former case both sharp discontinuities and continuously varying parameters are considered and attention is paid to both "wave-guide" and "non-wave-guide" propagation, with some practical illustrations. In the case of media with random inhomogeneities the method of correlation of the fluctuations in the sound field is discussed. The ultimate problem involves both types of inhomogeneities. *Subject Heading:* **Acoustical propagation in inhomogeneous media.**—*Author's abstract.*

10G–92 551.596.1:551.557

Cox, Everett F., **Sound propagation in air.** *Handbuch der Physik*, Berlin, 48:455–478, **1957.** 5 figs., table, 7 foot-refs., bibliog. p. 477–478 (42 refs.), 10 eqs. **DWB** (551.03 N236)—Nature of

sound compared with meteorological oscillations, effect of micrometeorological variables on sound, refraction, absorption and dispersion, reflection, ducts in atmosphere, blast damage, tropospheric refraction, anomalous propagation, natural oscillations of the atmosphere are discussed with supporting data in form of tables, graphs, etc. (*Same item as* 9.1–290, Jan. 1958, *MAB.*) *Subject Headings:* **1. Acoustical propagation 2. Acoustical wind sounding.**—*M.R.*

10G–93 551.596.1

Ginzberg, V. L., **Concerning the general relationship between absorption and dispersion of sound waves.** *Soviet Physics: Acoustics*, N. Y., 1(1/2):32–41, **1957.** 6 refs., 17 eqs. **DLC** (QC221.S6). Transl. of original Russian in *Akusticheskiĭ Zhurnal*, Moscow, 1955. (Paging unverified)—The general relationship between dispersion and absorption of sound is discussed. The problem is first attacked as applied to propagation of electromagnetic waves, and previously-known results are derived. Analogous equations are then obtained to relate the velocity and absorption coefficient of sound. The features that distinguish the acoustic case from the electromagnetic one are discussed. *Subject Heading:* **1. Sound absorption-dispersion relationships.**—*Author's abstract.*

10G–94 551.511.32:551.510.42

Sidorkina, S. I., **O nekotorykh dvizheniiakh aerozolia.** [Some aerosol motions.] *Akademiia Nauk SSSR, Doklady*, 112(3):398–399, Jan. 21, **1957.** fig., ref., eqs. **DLC**—Discusses the effect of particles in the air on hydrodynamic processes. The modified general adiabatic equation is presented. Such phenomena as shock waves, intense explosions of different geometry, frontal jumps and supersonic motion are mentioned in this short treatment. (*Same item as* 9.9–157, Sept. 1958, *MAB.*) *Subject Headings:* **1. Hydrodynamics 2. Aerosols 3. Explosion waves.**—*A.A.*

10G–95 551.596:551.510.61

Tonning, Andreas (*Norwegian Defence Res. Estab., Bergen*), **Scattering of electromagnetic waves by an acoustic disturbance in the atmosphere.** *Applied Scientific Research, Sec. B*, 6(6):401–421, **1957.** 6 figs., 3 refs., eqs. **DLC**—The variations in density associated with an acoustic wave are shown to influence the propagation of an electromagnetic wave. The variation in electric permittivity of the atmosphere, caused by an acoustic wave, is expressed by the power density of the wave. Under the assumption that the acoustic waves are spherical, the scattered field at large distances is given in terms of definite integrals which are evaluated by means of the method of Stationary Phase. The limiting case of plane acoustic waves is discussed, and two numerical examples are given. (*Same item as* 9.5–282, May 1958, *MAB.*) *Subject Headings:* **1. Acoustical waves 2. Scatter propagation.**—*Author's abstract.*

10G–96 551.541:623.454.8

Yamamoto, Ryōzaburō (*Met. Res. Inst., Kyoto Univ., Japan*), **Microbarographic oscillation produced by the Soviet explosion of a hydrogen bomb on Nov. 22, 1955.** *American Meteorological Society*, Bulletin, 38(9):536–539, Nov. **1957.** fig., 5 tables, 11 refs. **DWB, DLC**—Shida's microbarograms recorded on Nov. 22, 1955 at Yonago, Okayama and Kyoto and tables giving the occurrence times of individual phases at these three points, observed values of propagation velocities of the waves by the hydrogen bomb explosion on the Marshall Islands, Krakatoa explosion, etc., winds aloft data at Yonago and Shionomisaki, time intervals between successive crests and double amplitudes of the successive half-oscillations (mm Hg) are presented. On the basis of Namekawa's treatment of slightly dispersed internal gravitational waves a formula is developed to estimate the distance from the explosion site in western Japan. *Subject Headings:* **1. Microbarographic oscillations from H-bomb waves 2. Explosion waves 3. Acoustical propagation.**—*I.L.D.*

1958

10G–97 551.596.1:551.55

Bazilevich, V. V., **Vliianie atmosfernoĭ turbulentnosti na slyshimost' zvukov v atmosfere.** [Influence of atmospheric turbulence on the audibility of sounds in the atmosphere.] *Leningrad Glavnaia Geofizichekaia Observatoriia, Trudy*, No. 73:50–53, **1958.** 3 refs., 12 eqs. **DWB**—In this study of the effect of dynamic atmospheric turbulence upon the audibility of sounds in the atmosphere the author assumes that turbulence is isotropic and uniform. The wave equation for a sound wave field in an isotropic medium is

$$\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}-\frac{n^2\partial^2}{c_0^2\partial t^2}\right)\psi = 0$$

(where ψ—state of a point of the medium with coordinates, x, y, Z, n—index of refraction and c_0—

velocity of propagation of sound for selected initial conditions). In the case of plane waves this equation describes the propagation of an oscillatory process of the type $\psi = A(x,y,z)e^{i\omega\left(t-\frac{E}{c_0}\right)}$. The equation $\psi = Ae^{-\frac{\mu\omega x}{c_0}} e^{i\omega\left(t-\frac{E}{c_0}\right)}$ is derived; the magnitude $\mu\omega/c_0$ represents the coefficient of attenuation of the amplitude of sound with distance in an atmosphere with a given situation of dynamic turbulence. The equation $\mu = n_m \sqrt{\frac{3[(c-c_m)^2]_m}{c^2_m}}$ is obtained; c—instantaneous velocity of propagation of sound and c_m—average velocity of propagation for a given interval of time in a given place. The coefficient of attenuation of sound intensity in an atmosphere in the presence of dynamic atmospheric turbulence is given by $\alpha = \frac{4\pi}{\lambda_0}\theta\frac{\sigma(\mu)}{c_m}$ where $\theta = \sqrt{3}A_m$—any positive value, $\sigma(u)$—mean square value of the fluctuation of wind velocity and $c_m = \sqrt{kRT}$. In the case of a simultaneous influence of thermal and dynamical atmospheric turbulence upon the propagation of sound in the atmosphere the total coefficient of attenuation of sound is given by

$$\alpha = \alpha_t + \alpha_d = \frac{4\pi}{\lambda_0}\left(\eta\frac{\sigma(T)}{T_m} + \theta\frac{\sigma(u)}{c_m}\right).$$

Subject Headings: **1. Audibility 2. Turbulence effects.**—*I.L.D.*

10G–98 551.541:662.23

Berger, J.; Camion, Th. and Perennes, Ch., **Etude théorique du profil du front d'onde et de la vitesse de détonation de cartouches cylindriques d'explosif solide.** [Theoretical study of the wave-front profile and of the detonation speed of cylindrical cartridges with solid explosive.] *Académie des Sciences, Paris, Comptes Rendus*, 247(18):1433–1436, Nov. 3, **1958.** 3 figs., 5 refs. **DWB, DLC**—This theoretical study of the wave-front profile and of the detonation speed of cylindrical cartridges with solid explosive begins with a recall of the experimental results obtained by means of a revolving-drum camera. Study on the outflow of the detonation products and on the variations of the detonation speed with regard to the confinement which makes it possible to define the normal component of wave-speed. This study establishes a narrow connection between the front curvature, the wave-speed and the hydrodynamic laws of the detonation products release. *Subject Headings:* **1. Explosion waves 2. Detonation speed 3. Wave front.**—*A.V.*

10G–99 551.511:551.541

†Brossard, Jacques and Manson Numa, **Détermination comparée des caractéristiques des ondes explosives dans les mélanges gazeux.** [Comparative determination of the characteristics of explosive waves in gaseous compounds.] *Académie des Sciences, Paris, Comptes Rendus*, 247(23):2105–2108, Dec. 10, **1958.** 3 tables, 13 refs., 4 eqs. **DWB, DLC**—The characteristics of gases burnt just behind the explosive wave in a gaseous mixture may be determined either through a priori calculation by means of thermodynamic data, or by means of the law D (P_1, T_1) deduced from the velocity measurements of the explosive wave at various initial pressures P_1 and temperature T_1 of the explosive. Only few experiences were made on this subject; from these the author tries to find the possibility of deducing enough elements in order to make an approximate calculation of the preceding characteristics. *Subject Headings:* **1. Thermodynamics 2. Explosion waves.**—*A.V.*

10G–100 621.395.51:551.596.1:551.524:551.55

Groves, G. V. (*Dept. of Physics, Univ. College, London*), **Trajectory determination of a supersonic body by acoustical observations.** *Journal of Atmospheric and Terrestrial Physics*, London, 12(1):17–35, **1958.** fig., ref., 63 eqs. **DLC**—A theory is developed for deriving the trajectory of a body moving at supersonic speeds through the atmosphere from observations on the times of arrival of a shock wave at a number of microphones at known points on the ground, wind and temperature effects being taken into account. It is shown that with $3n+4$ microphones, the position, velocity, acceleration, etc., up to the nth derivative of the spatial coordinates of the body with respect to time can be found at some determined instant of time. Hence with 7 microphones, the position and velocity of the body at a certain instant of time can be found, although 4 microphones are seen to be adequate for a more approximate determination of these quantities. Particular consideration is given to the method of solution in the 7 microphone case. *Subject Headings:* **1. Acoustical soundings 2. Trajectory determination of supersonic bodies.**—*Author's abstract.*

10G–101 551.596.1

†Lysanov, Iu. P., **Teoriia rasseianiia voln na periodicheski nerovnykh poverkhnostiiakh; obzor.** [Theory of wave scattering on periodically uneven surfaces; a review.] *Akusticheskii Zhurnal*,

Moscow, 4(1):3–12, Jan./March **1958.** 3 figs., 79 refs., 4 eqs. **DLC**—Theories of wave scattering from uneven surfaces (applicable to reflection of sound waves from earth or ocean surface, radio wave reflection, submarine acoustic propagation, etc.) are reviewed. Discussed in particular are the methods of: 1. RAYLEIGH, 2. small disturbances, 3. L. M. BREKHOVSKIKH, 4. integral equations, 5. V. TWERSKY and 6. L. N. DERIUGIN. The literature references include Russian (25 refs.) and other (54) papers on radio and acoustic wave scattering. *Subject Headings:* **1. Acoustic wave scattering 2. Radio wave scattering.**—*G.T.*

10G–102 551.596.1:551.510.5:551.507.362

*Otterman, Joseph, **Effect of finite-amplitude propagation in the rocket-grenade experiment for upper-atmosphere temperature and winds.** Michigan. Univ. Engineering Research Institute, Contract DA-36-039 SC-64659, Technical Report (unnumbered), April **1958.** 15 p. 3 figs., 2 tables, 7 refs., 23 eqs. **DWB** (M10.5 M624ef)—This report presents an estimate of the effect of the finite-amplitude propagation on the travel times of pressure waves from the explosions to the ground and a method for taking this effect into account in the data reduction of the rocket grenade experiment for upper atmosphere temperature and winds. *Subject Headings:* **1. Acoustical soundings 2. Rocket grenade data.**—*Author's abstract.*

10G–103 534.2:551.596.1:551.510.3

Rocard, Yves, **Courbure des trajectoires sonores dans la haute atmosphère.** [Curvature of sound trajectories in the upper atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 247(22):1973–1975, Dec. 1, **1958.** 6 eqs. **DWB, DLC**—Putting the propagation of sound in the atmosphere in the form of an equation, and making allowance for the gravity, the author establishes that the characteristics of sound propagation in the air are such that each wave tends to a shock-wave when it gains in height. This effect alters the propagation speed which increases with altitude. It results from this, that the sound-trajectories are bent towards the earth when encountering other bending causes, gradients of temperature and wind, this contributing to create enormous sound ranges. This conclusion concerns the acoustical effects of strong explosions heard beyond the usual silence zone. *Subject Headings:* **1. Acoustical propagation 2. Sound trajectories 3. Temperature gradient 4. Wind gradient 5. Silence zone.**—*A.V.*

10G–104 551.507.362.1:551.596.1(98)

Stroud, W. G. (*U. S. Army Signal Res. and Develop. Lab., Fort Monmouth, New Jersey*), **Meteorological rocket soundings in the Arctic.** *American Geophysical Union, Transactions*, 39(2):789–794, Aug. **1958.** 4 figs., table. **DWB, DLC**—Various techniques used by the U.S.-IGY meteorological rocket soundings in the Arctic program are made available in this report. Temperature, pressure, density, and winds have been measured by these new devices. Experiments on the freely falling sphere, rocket-grenade, gage, aerodynamics and other methods of determining the dynamic processes of the upper atmosphere are discussed. The results achieved so far have been compared with the U.S.S.R. ventures along similar lines. *Subject Headings:* **1. Acoustical soundings 2. Rocket grenade experiments 3. Rocket soundings in Arctic.**—*N.N.*

10G–105 551.596.1:551.551:551.510.522

Suchkov, B. A., **Fliuktuatsii amplitudy zvuka v turbulentnoĭ srede.** [Sound amplitude fluctuations in a turbulent medium.] *Akusticheskiĭ Zhurnal*, Moscow, 4(1):85–91, Jan./March **1958.** 2 figs., 3 tables, 6 refs., 10 eqs. **DLC**—Results are reported of an experimental investigation of amplitude fluctuations of sound propagating in the lowest layer of the atmosphere. The dependence of the magnitude of sound amplitude fluctuations upon the distance between the source and the receiver is analyzed and found to be approximately linear. A comparison is made between values of sound amplitude fluctuations obtained by direct sound measurement and those calculated from vertical temperature and wind velocity gradients. An attempt is made to determine from the experimental data the lateral correlation function of the sound field. *Subject Headings:* **1. Turbulence effects on sound 2. Acoustical propagation in lower atmosphere.**—*Transl. of author's abstract.*

10G–106 551.596.1:551.

Suzuki, S. (*Tokyo*), **Aeolian tones in a forest and flowing cloudlets over a hill.** *Weather*, London, 13(1):20–25, Jan. **1958.** 4 photos, 7 refs. **DWB**—The notes heard when the wind blows through a pine forest are caused by the shedding of vortices with a certain frequency that depends on the wind speed. These sounds are called "matsukaze" in Japan. Examples of similar vortices in lee of hills or bullrushes are cited (Kármán vortex streets). The same effects are produced by a rod in running water or a coin or plate sinking in water. Periods observed in these instances are checked against Reynolds number, Stroubal number, etc. The lee clouds showing the Stroubal effect are not the same as those due to standing waves, as they are moving with the stream. *Subject Headings:* **1. Aeolian tones in forests 2. Stroubal effect 3. Lee clouds (flowing) 4. Matsukaze.**—*M.H.*

10G–107 534:551.541:551.594.12

Thouvenin, J., **Dissociation et ionisation de l'air par une onde de choc.** [Dissociation and ionization of air by a shock wave.] *Journal de Physique et le Radium*, Paris, 19(7):639–648, July **1958. DLC**—The composition and internal energy of air are computed for a range of temperature from 3500 up to 11,500°K and a range of density from 4 up to 12 times normal density. In another connection, the increase of internal energy of air by a shock wave traveling through it is evaluated in terms of the same parameters. By adjusting both expressions of energy, a relation between the temperature T and the ratio of molecular volumes V_0/V ahead and behind the shock front is obtained. The other physical variables, pressure, front velocity, material velocity, degree of ionization, can be then computed if either of parameters T or V_0/V is known. Conversely, measurement of any one physical variable makes it possible to get values of all the others. Present calculations show the oxygen to be completely dissociated by strong shock waves (velocities above 7000 m/s), the nitrogen by a rate of 50% higher, and the concentration of free electrons to be over 0.1%. *Subject Headings:* **1. Dissociation by shock waves 2. Ionization by shock waves.**—*Author's abstract.*

10G–108 551.551:551.596.1

Tverskoĭ, N. P., **Akusticheskaia kharakteristika turbulentnogo sostoianiia atmosfery.** [Acoustical characteristics of atmospheric turbulence.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 73:54–60, **1958.** 4 figs., 5 refs., 3 eqs. **DWB**—The turbulence condition of the atmosphere can be studied by observations on the propagation of sound waves within it. An indirect means of evaluating atmospheric turbulence is the use of the oscillation of the phase difference of a sound wave passing through an atmospheric layer. The equation for the missing coefficient is

$$K_A = \frac{\sqrt{\overline{\Delta\varphi^2}}}{A\,\frac{\omega}{\bar{c}^2}\left(\frac{L}{l_k}\right)^{\frac{1}{3}}} = \bar{u}_p l_k$$

($\sqrt{\overline{\Delta\varphi^2}}$—value of phase difference between the sound source and the sound wave, passing through mean characteristic distance (scale of correlation), L—distance covered by the sound wave in the region investigated, $\bar{c}$—corresponding frequency and mean velocity of sound, $\bar{u}_p$—mean pulsational velocity of sound). An experimental design to determine these relationships is described and the results are presented in graphs. The mean square variability of the phase difference depends essentially upon the condition of the atmosphere, wind velocity, gradient wind, temperature, etc. The oscillation of the phase increased sharply with the wind velocity. With increasing height, at which the sound wave is propagated, and height, at which the sound receivers are situated, the phase oscillation diminishes. Registration of pulsations of wind velocity for constant ω, $\bar{c}$, L and l provided data for determining $\bar{u}_p$ and ultimately A—a dimensionless magnitude which is equal to 5–6. The most characteristic values of turbulent structures occurring under different atmospheric conditions were determined by moving one sound receiver relatively to the other, situated perpendicularly to the sound wave. The value l_k was found to be an adequate characteristic of the turbulence conditions belonging to an atmospheric state. Furthermore the oscillation of the phase difference reflects the true turbulence state of the atmosphere. The turbulence coefficients computed by meteorological and acoustical means are compared and a close correlation is observed. *Subject Headings:* **1. Acoustical sounding of turbulence 2. Turbulence effects on sound.**—*I.L.D.*

10G–109 551.596.1:551.508

Wiener, Francis M.; Goff, Kenneth W. and Keast, David N., **Instrumentation for study of propagation of sound over ground.** *Acoustical Society of America, Journal*, 30(9):860–866, Sept. **1958.** 10 figs., 8 refs. **DLC**—An instrumentation system has been developed to allow determination of the relevant micrometeorological parameters of the atmosphere near the ground in order to relate them to the measured attenuation of an acoustic signal propagated along the ground. Arrays of precision cup anemometers and shielded thermocouples mounted on a 30-ft tower were used to obtain the mean wind and temperature gradients above the ground. To obtain a measure of the atmospheric turbulence, a high-speed wind vane and bead thermistor were used. The electrical signals obtained from scanning these transducer arrays were fed into a mobile central recording and control facility. Simultaneously, the information provided by the acoustic signal was recorded there by scanning the output of several microphones placed along two test courses each approximately one mile long. The mobile laboratory also contained the necessary equipment for energizing the two loudspeakers, one for each test course. This paper discusses the micrometeorological instrumentation in some detail, together with the calibration techniques used. Typical mean wind and temperature profiles as well as turbulence spectra are presented. The relation of the micrometeorological data to the propagation of sound along the ground is discussed elsewhere. *Subject Headings:* **1. Acoustical propagation measurement techniques 2. Micrometeorological effects on sound 3. Micrometeorological instruments.**—*Authors' abstract.*

1959

10G–110 551.596.1:534

Carlson, Harry W., **A wind-tunnel investigation of the supersonic boom.** *Aero/Space Engineering*, 18(7):38–39, 52, July **1959.** 5 figs., 3 refs. **DLC**—A study of the formation and propagation of shock fronts has been made by means of wind tunnel tests of very small models made at the Langley 4-ft supersonic pressure tunnel. The purpose was to investigate independently under controlled conditions, the effects of various airplane components for both the lifting and nonlifting cases. Typical results are shown graphically. It appears that, while the far field conditions are dependent to a large degree on the normal area distribution, they are also sensitive to model attitude for bodies that depart greatly from axial symmetry. *Subject Heading:* **1. Shock waves.**—*From author's text.*

10G–111 662.763:621.372:551.541:551.596.1

der Agobian, Roger, **Sur une méthode de détection des ondes de choc non ionisantes et sur l'emploi des ondes radioélectriques pour leur étude.** [A method of detecting non-ionizing shock-waves and their study through radioelectric waves.] *Académie des Sciences, Paris, Comptes Rendus*, 248(9):1308–1311; March 2, **1959.** 4 figs., 4 refs. **DWB, DLC**—In order to render detection of non-ionizing shock-waves more perceptible, one gives them possibility of propagating through a previously ionized gas mass. This method of sensitization consists of creating, through an auxiliary discharge, an "autonomous" gaseous plasma ("autonomous" referring to a plasma abandoned to its spontaneous decrease). One studies jointly, by radioelectric exploration and optical observation, the modifications appearing in a film of plasma when the shock-wave is passing. The author gives a description of the equipment used and its functioning. *Subject Headings:* **1. Gas discharge 2. Shock wave observation.**—*A.V.*

10G–112 662.21 551.541:551.596.1

Favier, Jacques and Fauquignon, Claude, **De l'accélération d'une onde de choc génératrice de la détonation d'un explosif condensé.** [Acceleration of a shock-wave, causing detonation of a condensed explosive.] *Académie des Sciences, Paris, Comptes Rendus*, 248(9):1291–1294, March 2, **1959.** 3 figs., 6 refs. **DWB, DLC**—When a shock-wave causes detonation of a condensed explosive, an acceleration of this shock-wave exists in the zone preceding the capping stage of the detonation; this acceleration is continuous until the stable detonation regime is reached. This result permits to corroborate a thermic diagram of forming and maintenance of a detonation wave in an explosive. The experimental device consists in two cartridges of blasting agent, the one normally capped and called generating cartridge, the other uncapped and called receiving cartridge. The blasting agent used in a compound of hexogene and tolite; the actionless interposed substance is plexiglass. *Subject Heading:* **1. Shock wave acceleration.**—*A.V.*

10G–113 551.596.1

Ives, Ronald, **Apparent relation of aircraft noise to inversions.** *American Meteorological Society Bulletin*, 49(3):149–150, March **1959.** fig., ref. **DWB**—An investigation is reported in which aircraft noise was recorded in order to determine its relation to meteorological conditions. Under inversion conditions noise was found to be offensive when aircraft flew below the inversion and to be almost indetectable with aircraft above the inversion. Similar conditions were noted with stratus layers. *Subject Headings:* **1. Aircraft noise 2. Inversion effects.**—*G.T.*

10G–114 551.511.6:534.

Jorand, Michel, **Influence de la turbulence sur l'amortissement du son dans l'atmosphère libre** [Influence of turbulence on sound attenuation in the free atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 248(9):1306–1308, March 2, **1959.** 2 refs. **DWB, DLC**—In order to explain the sound-deadening in the free atmosphere, it is suggested to bring in the air turbulence. In a turbulent atmosphere, viscosity coefficient may be considered as being a function of the scale at which it is taken into account. One replaces the classical viscosity coefficient v, which was constant and corresponded solely to thermal agitation, through the kinematical viscosity coefficient the scale becoming (L, v_L) which is variable and function of scale L. From the relation established between the scale of time T and the scale of lengths L one has deduced the variation of the kinematical viscosity coefficient v_L with the considered scale L. This enables to explain sound-deadening observed in the free atmosphere. *Subject Headings:* **1. Acoustics 2. Sound attenuation 3. Turbulence.**—*A.V.*

10G–115 551.524.7:551.557:551.596.1:551.507.362

Otterman, Joseph, **Finite-amplitude propagation effect on shock-wave travel times from explosions at high altitudes.** *Acoustical Society of America, Journal*, 31(4):470–474, April **1959.** 3 figs., 7 refs., 24 eqs. **DLC**—A method is described for calculating the effect of the finite-amplitu

propagation on the travel times of pressure waves from explosions at high altitudes to the ground. Numerical results are presented for explosions of 2-lb and 4-lb H.E. charges at altitudes ranging from 15 to 95 km. Vertical propagation is assumed in the calculations. This work has been carried out in order to improve the systematic accuracy of the rocket grenade experiment for upper atmosphere temperature and winds. The significance of the finite-amplitude propagation in this experiment is discussed. *Subject Headings:* **1. Explosion waves 2. Upper air temperature measurement 3. Upper air wind measurement 4. Rocket grenades.**—*Author's abstract.*

10G–116 534.2:551.551:551.596.1

Rocard, Yves, **Focalisations d'énergie sonore dans l'atmosphère dues à l'effet du vent.** [Focussing of sound-energy in the atmosphere, due to wind effect.] *Académie des Sciences, Paris, Comptes Rendus*, 248(4):538–540, Jan. 26, 1959. 2 refs., eqs. **DWB, DLC**—The changes of sound propagation due to the wind regime lead to important focussings and defocussings of sound waves altering greatly their reception at long distances. The author has determined an equation providing the factor through which propagation reinforces the wave's energy on a determined run, in comparison with the case of propagation without wind. Applications give passably diverse results according to the occurring meteorological conditions; a factor from $\frac{1}{3}$ to 3 on a 5000 km propagation is not exceptional *Subject Headings:* **1. Acoustical propagation 2. Sound waves focussing 3. Wind effect on acoustical propagation.**—*A.V.*

SUPPLEMENTARY MATERIAL

10G–117 532.59(02) 551.596.1

†Brekhovskikh, L. M., **Volny v sloistykh sredakh.** [Waves in stratified media.] Moscow, Izdatel'stvo Akademii Nauk SSSR, **1957.** 502 p. 189 figs., 13 tables, 208 refs. numerous eqs. **DLC** (QC231.B85)—In this general but detailed text on wave motions of all types in stratified media: radio and light (electromagnetic) waves in liquids and gases are treated at great length for both homogeneous and stratified media; reflection and refraction of spherical waves, and propagation in stratified media are considered in detail, and sound waves in particular: in liquids and gases (p. 325–359, and 445–458) on a theoretical and empirical basis with numerous nomograms and schematic diagrams, the special case of acoustical propagation in a 3-layer medium is treated on p. 343–347 and group velocities p. 349–350. Focusing of sound waves is discussed on p. 455–458. Much of the work is based on the author's own research in underwater propagation (1954–56). *Subject Heading:* **1. Wave motion textbooks 2. Acoustical propagation 3. Sound wave focusing.**—*M.R.*

10G–118 551.596.1(02)

Ingard, Uno (*M.I.T.*), **Acoustics.** (In: Condon, E. U. and Odishaw, Hugh, (*eds.*), **Handbook of physics.** N. Y., McGraw-Hill, **1958.** Pt. 3:112–133. 6 figs., 5 tables, 85 refs., 62 eqs.) **DWB** (530 C756ha)—In this concise presentation of acoustic theory and applications, the general equations of sound propagation, sound sources and their fields, propagation in the atmosphere and in tubes, absorption of sound, scattering, detection of sound, architectural acoustics and ultrasonics are discussed. In the section on atmospheric sound propagation the equations pertaining to ray acoustics (phase velocity, group velocity, shadow zones), intensity in the shadow zone, scattering by turbulence and ground absorption are developed. *Subject Headings:* **1. Acoustical propagation 2. Handbook of physics.**—*G.T.*

10G–119 551.524.7:551.557:551.596.1

Kaplan, J.; Schilling, G. F. and Kallmann, H. K., **Methods and results of upper atmosphere research.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 43, Nov. **1955.** 162 p. numerous figs. and tables, refs. at end of each chap., numerous eqs. Also issued as California. Univ. Institute of Geophysics, Contract AF 19(604)-111, Scientific Report No. 3, Nov. 30, **1954. . DWB**—Ch. 8 (p. 90–100) is a review of results of measurements of temperature and wind velocity made between 30 and 180 km altitude by means of acoustic propagation techniques. Some of the results reported by various authors (Crary, Kennedy, Cox, Whipple, Gutenberg) are shown in tables and diagrams. (For abstracts covering the whole report, *see* 8.5–22 and 6.9–9, May 1957 and Sept. 1955, *MAB.*) *Subject Headings:* **1. Upper air temperature measurement techniques 2. Upper air wind measurement techniques 3. Acoustical propagation.**—*G.T.*

10G–120 551.507.362:551.596.1

Otterman, Joseph, **A simplified method for computing upper-atmosphere temperature and winds in the rocket-grenade experiment.** Michigan. University Engineering Institute. Dept. of Aeronautical Engineering, Contract DA-36-039-SC-64659, Project DA-3-17-02-001, Technical Report

(unnumbered), June **1958.** 40 p. 7 figs., 6 tables, foot-refs., numerous eqs. **DWB** (M07.362 089si)—A much simpler method than that which is used at the present for the calculation of temperatures and winds at high altitudes has been presented in this report. The data were obtained from the rocket-grenade experiment conducted by the Engineering Research Institute of the University of Michigan. The outline of the book consists of the method of the data reduction, the calculation of the characteristic velocities from the times of arrival at the microphones, equations for meteorological parameters in a layer with a known sound-ray path, equations for tracing the sound-ray through a layer with known meteorological parameters, and many others. The method is exemplified by applying it to the data from SM 1.01 and SM 1.02 rocket flights. *Subject Headings:* **1. Rocket-grenade temperature determination 2. Rocket-grenade wind determination 3. Acoustical soundings 4. Upper air soundings.**—*N.N.*

10G–121 551.596.1:551.21

Stewart, K. H., **Air waves from a volcanic explosion.** *Meteorological Magazine*, London, 88-(1039):1–3, Jan. **1959.** fig., 7 refs. **DWB, DLC**—Explosion of the volcano Bezyymyannaya Sopka in Kamchatka (55°57′N, 160°32′E) at 0611 GMT, March 30, 1956 was reported to have "exceeded several dozen times the strength of an explosion of an ordinary atom bomb." Re-examination of the microbarograph record at Kew Observatory for the day shows the arrival of the air wave, also traceable on the float and on the photo barographs. Eskdalemuir and Lerwick recordings also clearly featured the rapid, about 0.2 mb, pressure fall as tabulated here with clock corrections. Thermonuclear 0.2 mb pressure fall has been recorded at Kew Observatory. The difference between sound waves and "long" waves is considered in relation to propagation influenced by atmospheric temperature, and likewise the wave energy as influenced by elevation. In this case the energy was found to be 1×10^{21} ergs. *Subject Headings:* **1. Explosion waves 2. Volcanic explosions 3. Kamchatka, U.S.S.R.**—*W.N.*

10G–122 532.59 551.596.1(02)

Taub, A. H. (*Illinois Univ.*), **Wave propagation in fluids.** (In: Condon, E. U. and Odishaw, Hugh (*eds.*), **Handbook of physics.** N. Y., McGraw-Hill, **1958.** Pt. 3:50–63. 2 figs., 27 refs., 99 eqs.) **DWB** (530 C746ha)—In this theoretical treatment of wave propagation in ideal fluids, equations describing fluid wave motion with the help of the laws of conservation of mass, momentum and energy are developed. The cases of small disturbances (e.g. acoustic waves), interactions of waves of small amplitude, small disturbances in shallow water, plane waves of finite amplitude, formation and decay of shocks in one dimension, spherical waves of finite amplitude and effect of viscosity and heat conduction are treated analytically. *Subject Headings:* **1. Wave propagation in fluids 2. Handbook of physics.**—*G.T.*

PART III. REVIEWS, TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

MacDonald, W. F.: **Notes on the problems of cargo ventilation.** *World Meteorological Organization, Technical Note*, No. 17, 1957. 38 p. Price 3 Swiss fr. Review by C. E. N. Frankcom in *Marine Observer*, 28(181):154–155, July 1958. (*See* 9.4–60, April 1958, *MAB*)

Meixner, Franz: **Föhn und Kriminalität** [Föhn and criminality]. Hamburg, Verlag Kriminalistik, 1955. 48 p. 26 figs. Price DM 2.80. Review by H. Ungeheuer in *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:186, 1958.

Neis, Bernhard: **Fortschritte in der meteorologischen Forschung seit 1900** [Progress in meteorological research since 1900]. Frankfurt a.M. Akademische Verlagsgesellschaft, 1956. 238 p. figs., ports, tables, eqs., bibliogs. Review by G. A. Bull in *Meteorological Magazine*, London, 87(1029):93–94, March 1958. [*See* 8.8–17, Aug. 1957, *MAB*]

Norwegian-British-Swedish Antarctic Expedition 1949–1952: **Scientific Results.** Pub. Oslo, Norsk Polar-Institutt, 1956–1957. Review by W. H. Ward of several sections in *Geographical Journal*, London, 124(2):238–241, June 1958.

Ott, H.: **Bluthochdruck und subarktisches Klima** [High blood pressure and the subarctic climate]. *Die Medizinische*, p. 872–876, 1957. Review by H. Jungmann in *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:187, 1958.

Panofsky, Hans A. and Brier, Glenn W. [eds.]: **Some applications of statistics to meteorology.** University Park, Pa., College of Mineral Industries, Pennsylvania State Univ., 1958. 224 p. figs., tables, refs., eqs. Review by Arnold Court in *American Meteorological Society, Bulletin*, 39(9):502–503, Sept. 1958. (*See* 9.6–4, June 1958, *MAB*)

Peek, Bertrand M.: **The planet Jupiter.** N. Y., Macmillan, 1958. 283 p. illus. Price $8.50. Review by G. de Vaucouleurs in *Science*, Wash., D. C., 128(3321):410, Aug. 22, 1958.

Rawer, Karl: **The ionosphere.** N. Y., Frederick Ungar Pub. Co., 1957. 202 p. Price $7.50. Review by E. V. Appleton in *Journal of Atmospheric and Terrestrial Physics*, London, 12(2/3): 223, 1958. Review in **Institution of Electrical Engineers, Journal,** 4(44):463, Aug. 1958. (*See* 9.11–13, Nov. 1958, *MAB*)

Rossi, Veikko: **A new Finnish radiosonde, a radiosonde provided with thermostat.** *Finland. Ilmatieteellinen Keskuslaitos, Toimituksia*, No. 43, 1957. 22 p. figs., photo, tables, refs., eqs. Review by G. Cena in **Rivista di Meteorologia Aeronautica,** Rome, 18(3):72–73, July/Sept. 1958.

Shapley, Harlow: **Of stars and men: the human response to an expanding universe.** Boston, Beacon Press, 1958. 157 p. Price $3.50. Review by G. C. McVittie in *Science*, Wash., D. C., 128(3319):295, Aug. 8, 1958.

Verber, J. I.: **Bibliography of physical limnology, 1781–1954.** *Ohio. Dept. of Natural Resources. Div. of Shore Erosion, Report of Investigations*, No. 25, 1955. 57 p. Review by Adam Synowiec in *Przegląd Geograficzny*, Warsaw, 30(1):174–175, 1958. (*See* 7.4–39, Apr. 1956, *MAB*)

Watson-Watt, Sir Robert: **Three steps to victory.** Pub. London, Odhams, 1958. 480 p. Price 30 sh. Review in *Institution of Electrical Engineers, Journal*, 4(44):464, Aug. 1958. Review by R. L. Smith-Rose in *Nature*, London, 182(4633):415–416, Aug. 16, 1958. Review in *Institution of Navigation, Journal*, 11(4):418–422, Oct. 1958.

White, Gilbert F. (ed.): **The future of arid lands.** Papers and recommendations from the International Arid Lands Meetings (Albuquerque, N. M., 1955). Review by R. R. Braham, Jr. in *American Meteorological Society, Bulletin*, 39(2):97, Feb. 1958. [*See* 8.4–5, April 1957, *MAB*]

B. TRANSLATIONS AND RECENT MONOGRAPHS

TRANSLATIONS

Akademiia Nauk SSSR. Komitet po Geodezii i Geofizike: **Bibliography of scientific reports in hydrology, presented at the XI General Assembly of the I.U.G.G. Association of Scientific Hydrology.** (Transl. of the original Russian, **Soobshcheniia o nauchnykh rabotakh po gidrologii. . . .** Issued Moscow, 1957. 30 p. 552 refs.) Transl. (photostat of typescript) available DWB (M79 R425). 76 p.

Alekseev, P. P.; Besiadovskiĭ, E. A.; Golyshev, G. I. et al.: **Rocket investigation of the atmosphere.** (Transl. of original Russian, **Raketnye issledovania atmosfery,** in *Meteorologiia i Gidrologiia*, Leningrad, No. 8:3–13, 1957. 6 figs., table, refs., eqs.) Transl. available for reference DWB (M10 A366ro)

Bagariatskiĭ, B. A.: **Data on the infra-red spectral energy distribution of the aurora.** (Transl. of original Russian, **Nekotorye dannye o raspredelenii energii v infrakrasnom spektre poliarnykh siianiĭ,** in *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:540–542, 1957. figs., tables, refs.) Transl. by R. E. Daisley in the English language edition of the **Izvestiia,** *Bulletin of the Academy of Sciences of the U.S.S.R., Geophysics Series*, No. 4:149–152, 1957, issued by the American Geophysical Union. Transl. available DWB.

Bagrov, N. A. and Morskoĭ, G. E. [eds.]: **Voprosy predskazaniia pogody** [Problems of weather forecasting]. Issued Leningrad, Gidrometeoizdat, 1958. 439 p. figs., tables, bibliogs., eqs. Transl. of 18 outstanding U. S. and German papers on general circulation theory, weather lore, numerical, short, extended and long-range forecasting, forecast verification . . . between 1939–1956. Transl. available for reference DLC (QC995.B2)

Bakhvalov, N. S.: **Some remarks on the problem of the numerical integration of differential equations by finite difference methods.** (Transl. of original Russian, **Nekotorye zamechaniia k voprosu o chislennom integrirovanii differentsial'nykh uravneniĭ metodom konechnykh raznostei,** in *Akademiia Nauk SSSR, Doklady*, 104(6):805–808, 1955. 3 refs., 13 eqs.) Transl. by M. C. Wheeler available for reference DWB (517.38 K81so)

Baranov, A. M.: **Vertical extent of high-level clouds over European USSR.** (Transl. of original Russian, **Vertikal'naia protiazhennost' oblakov verkhnogo iarusa nad Evropeĭskoĭ territorieĭ SSR,** in *Meteorologiia i Gidrologiia*, Leningrad, No. 6:22–25, June 1958. fig., 3 tables, 7 refs.) Transl. by R. S. Quiroz available DWB (M76.2B225ve)

Breido, Ts. G.: **Adsorption of ions by water drops in a stream of air.** (Transl. of original Russian, **Adsorbtsiia ionov kapliami vody v potoke vozdukha,** in *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:87–91, Jan. 1956. 3 tables, refs., eqs.) Transl. available from Associated Technical Services, P. O. Box 271, East Orange, New Jersey as its ATS-33K21R.

Diubiuk, A. F.: **Determination of the wind through a pressure field in computing the friction of vertical and horizontal mixing.** (Transl. of original Russian, **Opredelenie vetra cherez pole davleniia pri uchete treniia vertikal'nogo i gorizontal'nogo peremeshivaniia,** in *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:274–276, 1958. refs., 21 eqs.) Transl. by John Miller issued by American Meteorological Society under Contract AF 19(604)-1936, June 1958. 7 p.

Hope, E. R., ed.: **The earth's exterior atmosphere and the counterglow. The counterglow as related to modern geophysical theories.** 3d ed. With seven recent Russian papers collected and translated by E. R. Hope. Issued, Ottawa, Defence Research Board, Defence Scientific Information Service, April 30, 1957. 51 p. figs., tables, refs., eqs. (*For abstract on 2d ed.* (1954) and listing of the seven papers, *see* 6.5–8, May 1955, *MAB*)

Massachusetts Institute of Technology. Lincoln Laboratory: **Collection of Soviet papers on earth satellites.** Issued Oct. 31, 1957; reissued Jan. 13, 1958. 182 p. figs., tables, refs., eqs. DWB (629.1388 M414co). 13 papers, from original Russian, all but three from *Uspekhi Fizicheskikh Nauk*, Moscow, 63(1), Sept. 1957. For listing of all titles from this issue of the Russian journal, *see* Pt. III, p. 384–385, March 1958, *MAB*.

RECENT MONOGRAPHS

Abbot, Charles Greeley: **Adventures in the world of science.** Wash., D. C., Public Affairs, 1958. 150 p.

Bendat, Julius S.: **Principles and applications of random noise theory.** N. Y., John Wiley, 1958. 431 p. figs., tables, refs., eqs.

Callaghan, F. R., (ed.): **Science in New Zealand.** Wellington, N. A., A. H. and A. W. Reed, 1958. 272 p. figs., plates, maps, refs.

Denisov, Iuriĭ Stepanovich: **Radiotekhnika v artilleriĭskoĭ meteorologii** [Radio techniques in artillery meteorology]. Moscow, Izdatvo Ministerstva Oborony Soiuza SSR, 1958. 92 p. figs., tables, eqs.

Dumont, René: **L'ionosphère et l'optique géométrique des ondes courtes** [The ionosphere and the geometric optics of short waves]. Paris, Dunod, 1958. 100 p. figs., refs. [*Monographies Dunod*, No. 3]

Galbraith, William: **Extensive air showers.** London, Butterworths Scientific Publication, 1958. 211 p. figs., plates, refs., eqs.

Ginsburg, Norton and Roberts, Chester F., Jr.: **Malaya.** Seattle, Univ. of Washington Press, 1951. 533 p. figs., maps, numerous tables, bibliog.

Hamilton, Richard A. (ed.): **Venture to the Arctic.** London, Penguin Books, 1958. 283 p. figs., plates, bibliog.

Khrgian, A. Kh.: **Fizika atmosfery** [Physics of the atmosphere]. 2d ed. Moscow, Gos. Izdat. Fiziko-Matematicheskoĭ Literatury, 1958. 476 p. figs., tables, numerous refs., bibliog.

Metcalfe, John Wallace: **Information indexing and subject cataloging: alphabetic, classified, coordinate, mechanical.** N. Y., Scarecrow Press, 1957. 338 p. refs.

Moore, Harry Estill: **Tornadoes over Texas: a study of Waco and San Angelo in disaster.** Austin, Univ. of Texas Press, 1958. 334 p. figs., tables, numerous foot-refs.

Moore, Patrick: **Guide to the planets.** N. Y., W. W. Norton, 1954. 222 p. figs., plates, refs.

Newton, H. W.: **Face of the sun.** London, Harmondsworth Penguin Books, 1958. 208 p. figs., refs.

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Rodenwaldt, Ernst: **Tropenhygiene: Lebenshaltung und Lebensführung in warmen Ländern** [Tropical hygiene: standards and manner of living in warm climates]. 5th improved and enlarged ed. Stuttgart, Ferdinand Enke, 1957. 179 p. figs., refs.

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★**Acta Geophysica Polonica,** [Warsaw].
Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and **Ser. Geofiz.,** [Moscow].
American Geophysical Union, Transactions, [Washington].
★**American Meteorological Society, Bulletin,** [Boston].
★**Angewandte Meteorologie,** [Potsdam].
Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B,** [Vienna].
Australian Journal of Physics, [Melbourne].
★**Australian Meteorological Magazine,** [Melbourne].
★**Ciel et Terre,** Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
★**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
★**Geophysical Magazine,** Japan Meteorological Agency, [Tokyo].
Hemel en Dampkring, [The Hague].
★**Időjárás,** Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
★**Journal de Mécanique et de Physique de l'Atmosphère,** Société Météorologique de France.
★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
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★**Meteorological Society of Japan, Journal,** [Tokyo].
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★**Meteorologische Rundschau,** [Berlin].
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★**Rivista di Meteorologia Aeronautica,** Servizio Meteorologico, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**South Africa, Weather Bureau, Notos,** [Pretoria].
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
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★**Weather,** Royal Meteorological Society, [London].
★**Weatherwise,** American Meteorological Society, [Boston].
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**WMO Bulletin,** World Meteorological Organization, [Geneva].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

★ Indicates those periodicals which are primarily meteorological.

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